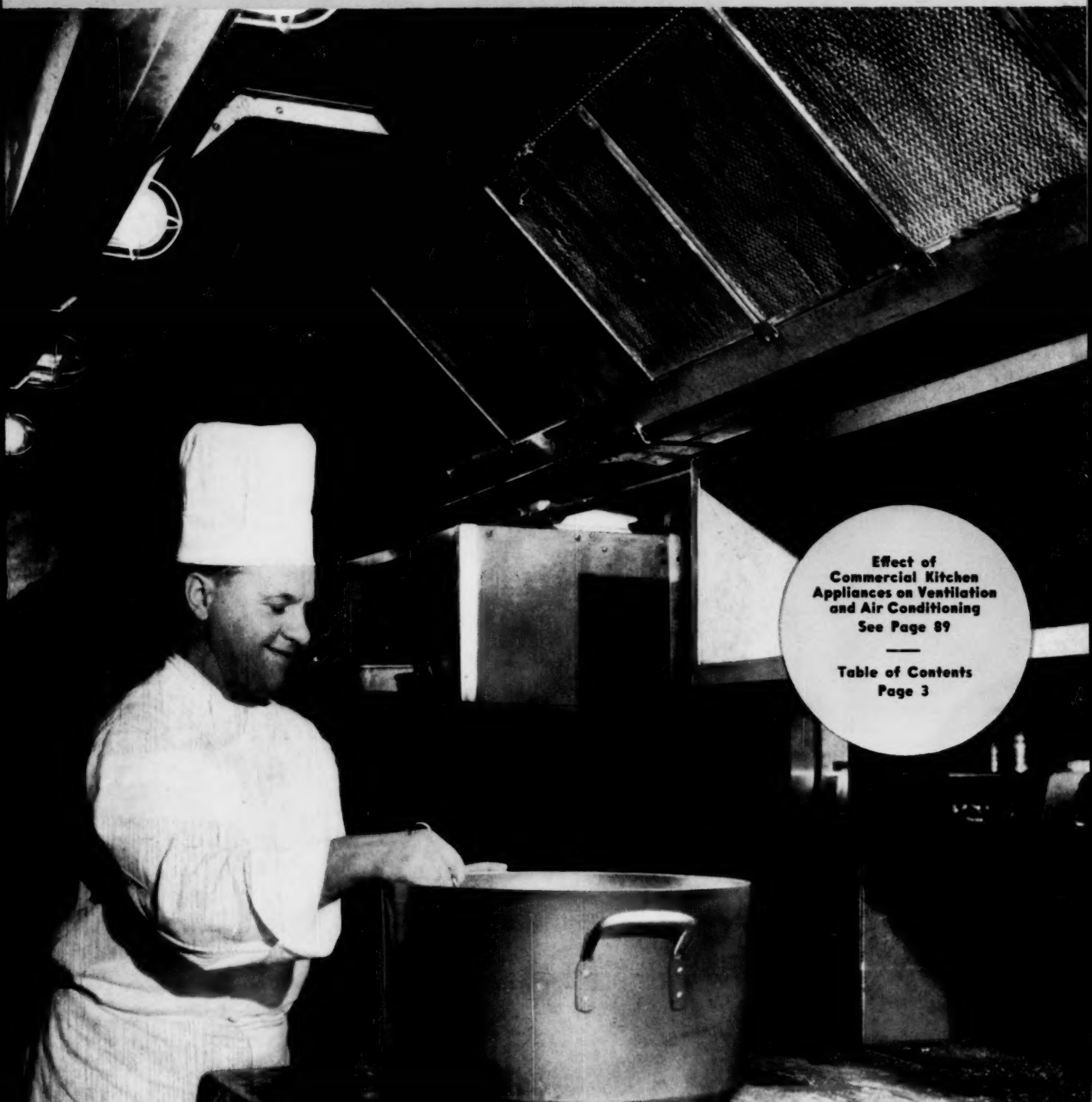
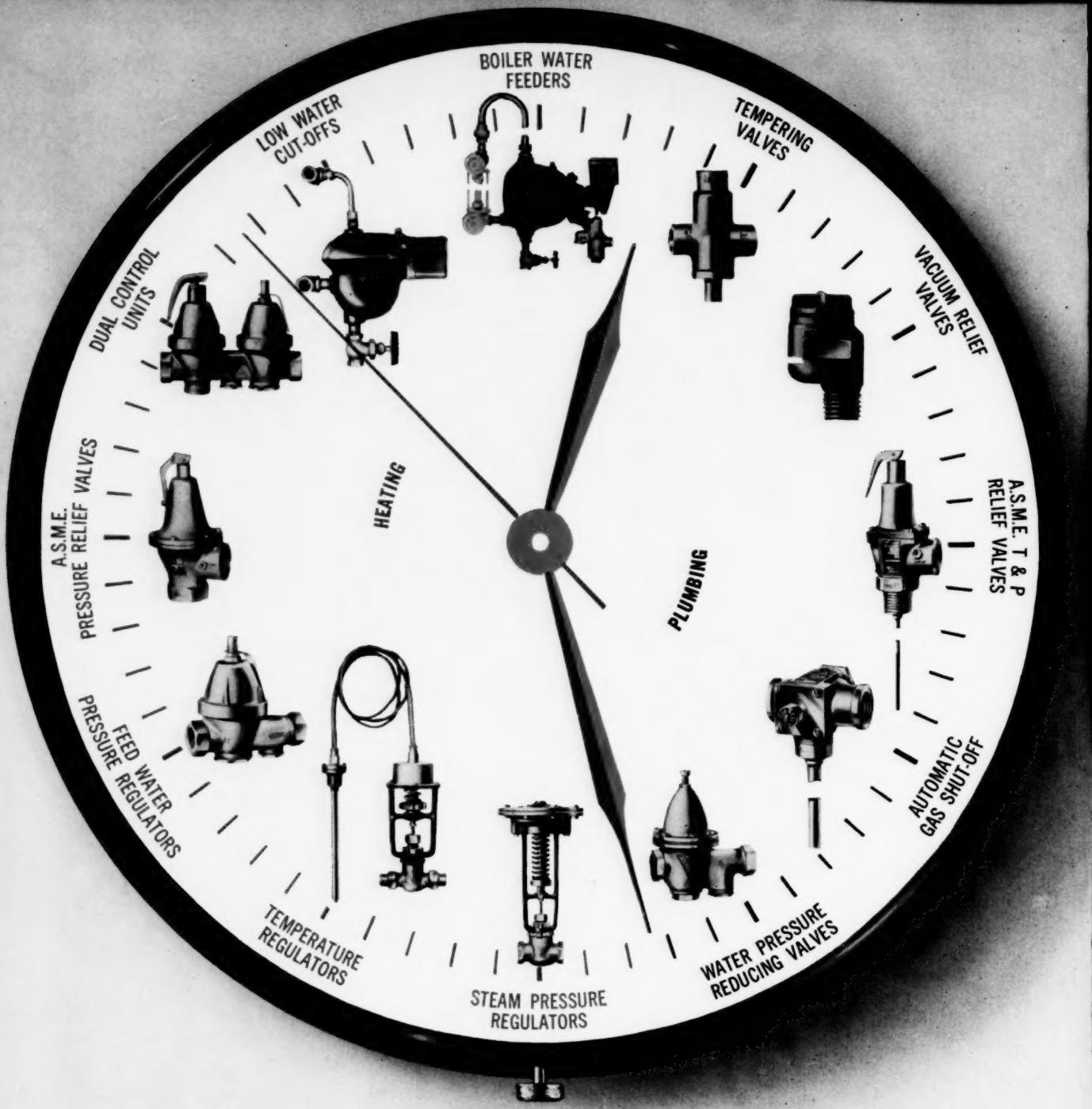
AIR CONDITIONING HEATING AND VENTILATING

APRIL, 1959—56th Year



Effect of Commercial Kitchen Appliances on Ventilation and Air Conditioning
See Page 89

Table of Contents
Page 3



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Time-Proved . . . *in Residential, Commercial, Industrial and Institutional Installations*

How Much Steam Should a Steam Trap Trap?

. . . some answers to commonly asked questions about the primary job of a steam trap

You don't need a doctor's degree in thermodynamics to answer the question at the top of this page. Naturally, a steam trap should trap *all* the steam.

Unfortunately for you, the problem isn't quite that simple. After all, a shut off valve would trap all the steam . . . and condensate, and air, and carbon dioxide as well.

So we'd better amend the answer to the question this way: A steam trap should trap *all* the steam but *must* remove condensate, air and carbon dioxide as rapidly as they accumulate.

With this established, let's take a closer look at what's involved:

A Steam Trap Should Trap All The Steam

If you've had experience with several different makes of traps, you already know that some trap steam better than others. The operating principle of the trap is what makes the difference. We like to talk about it because Armstrong traps are designed so that no steam can get to the orifice. The valve is always water sealed. Result: *More efficient steam utilization, lower fuel costs.*

A Steam Trap Should Remove Condensate

All traps remove condensate—after a fashion. For maximum efficiency in the unit being drained, though, the trick is to get it out without waiting for it to cool and without leaking steam.

Armstrong's water sealed valve takes care of steam leakage. The inverted bucket operating principle opens the trap for water regardless of its temperature. This means you get the condensate out as quickly as it accumulates. Result: *Higher temperatures and better heat transfer in steam heated units.*

A Steam Trap Should Remove Air and CO_2

Part and parcel of the condensate removal problem is removal of air as well as oxygen and carbon dioxide—two real troublemakers. Air tends to reduce operating temperatures and interfere with heat transfer. CO_2 goes into solution to form corrosive carbonic acid which, for example, can eat unit heater tubes. O_2 aggravates the situation. Believe it or not, but all traps don't properly remove air and CO_2.

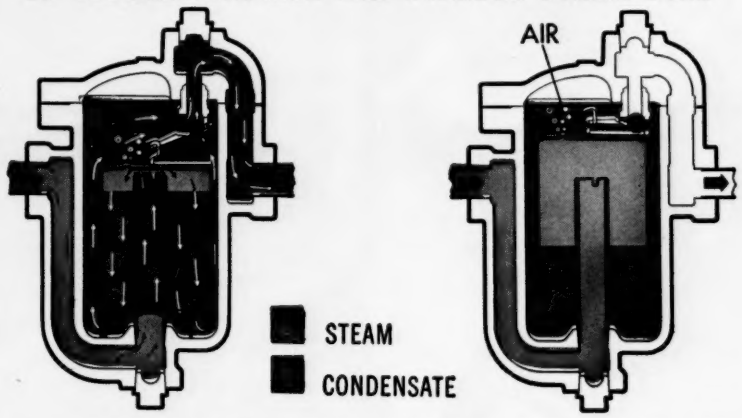
By now, you've probably guessed that Armstrong traps *do* remove air and CO_2. Armstrong design (see illustration) provides continuous venting of air and CO_2. By opening suddenly, the Armstrong trap creates a momentary pressure drop to "pump" the air down to be vented. Result: *Higher temperatures, faster heat-up, better heat transfer and reduced corrosion.*

Note: When required, specially sized air vents are furnished. For fast heat-up of low pressure on-and-off units, Armstrong provides open float and thermostatic air vent traps.

What's the Final Answer?

Summing it all up, you'll get the best service from steam heated units that are equipped with traps designed to trap *all* the steam and remove air and condensate as quickly as it accumulates. In our prejudiced viewpoint, this means Armstrong traps. More important are the several thousand users of Armstrong traps who have proved the point.

HERE'S THE STEAM TRAP DESIGN THAT GETS RID OF CONDENSATE AND AIR WITHOUT STEAM LOSS



Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

Before you make up your mind, though, consider the minimum maintenance requirements of Armstrong traps . . . and the convenient assistance your local Armstrong Representative provides. These are important plus values.

Put Up or Shut Up

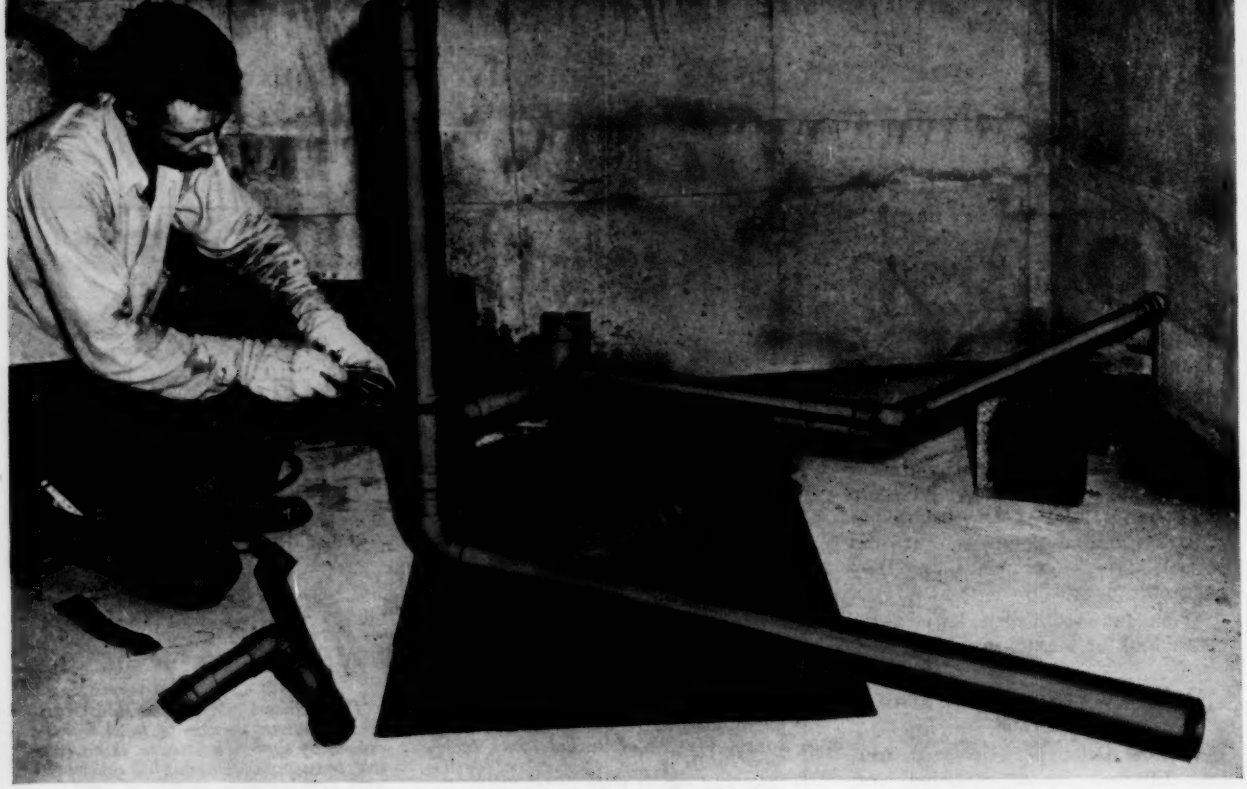
We're so confident that we "put up". Armstrong traps are unconditionally guaranteed to satisfy. So you can find out for yourself with practically no risk. If you're not completely satisfied with the way they do their job, you can get your money back.

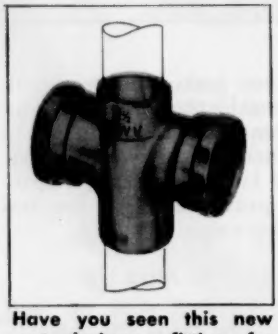
* * *

The 44-page Armstrong Steam Trap book goes into greater detail on these and other Armstrong features. It also discusses trap selection, installation and maintenance. Ask your Armstrong Representative for a copy or write

Armstrong Machine Works
8467 Maple Street
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS





Have you seen this new cast drainage fitting for back-to-back waste lines?

Anaconda Fitting 1835-3-3 lets you install threaded nipples to copper stack prior to plastering.

Our fittings catalog lists complete range of drainage fittings. Ask for Anaconda Publication C-12.

PREASSEMBLY WITH COPPER TUBE CUTS COST. You save time using Anaconda copper tube and solder-joint fittings for drainage lines—plumbing trees can be assembled in the shop or at the job—when and where it's most convenient. Copper tube gets the job done quicker—construction schedules are maintained. Fatigue and strain from handling heavy materials, particularly in overhead work, are eliminated because a copper installation weighs only *one fourth* as much as one of ferrous piping. (No heavy tools needed either.) Save time, effort and money—install the modern drainage system with Anaconda copper tube and fittings. For more information on copper tube, write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

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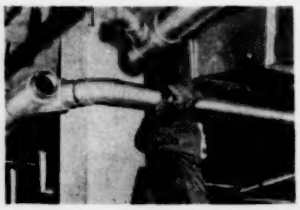

Compact Connections—Save Space

THE COVER

View of the kitchen of the Sheraton Hotel, Philadelphia, Pa., showing filters at the exhaust air outlets located under the hood over the ranges. Photograph, courtesy of Sheraton Hotel management.

AIR CONDITIONING HEATING AND VENTILATING

Volume 56, Number 4 April, 1959

PIPING

Design Procedure for Slip-Type Expansion Joints 65
With special emphasis on anchors and supports .....K. S. Roberts

PLUMBING

Hotel Modernization Program 69
Plumbing was the key to Chicago hotel's progressive program.

ENGINEERING TECHNIQUES

New Tool for Engineers: The One-Minute Camera 72
Prints-in-a-minute can save time and trouble .....E. L. Kessler

RADIANT HEATING

Infra-Red Space Heating 74
Application of gas-fired units .....Marc Resek and Fred J. Prince

HEATING CONTROLS

Correct Flow Water Temperatures at Partial Heating Loads 78
Curves give data to prevent overheating .....R. L. Koral

CORROSION

Can You Tell an Anode from a Cathode? 82
Direction of current is the clue .....W. E. Edwards

FANS

How the User May Obtain Purchased Fan Performance 83
Good results come from proper connections .....H. Geissler

PIPING

Data Sheet—Items in Laboratory Piping Practice 85
A check list in modern design for gas and water piping.

FLUID FLOW

Data Sheet—Formulas for Sizing Control Valves 86
Use of valve flow coefficient.

PIPING

Detail Sheet—Two-Temperature Water Hookups 87
Also, mountings for refrigeration compressors.

VENTILATION

Building Type Section—Commercial Kitchen Ventilation 89
Effect of kitchen units on air conditioning design .....E. A. Jahn

MATERIAL TESTING

Thermal Insulation Materials 100
Report from this committee of American Society for Testing Materials.

DEPARTMENTS

High Spots in the News 4
Washington Overtones—L. Overman 6
Briefly Stated News Items .. 10
Scientific Frontiers 16
Piping and Plumbing—L. Blendermann 97
Product Applications 101
News of the Month 102
New Equipment and Materials 105
Degree-Days for February, 1959 130
New Catalogs 134
Coming Events 150
Canadian Degree-Days for February, 1959 155
What Readers Say 156
Ad-Digest 161

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HIGH SPOTS

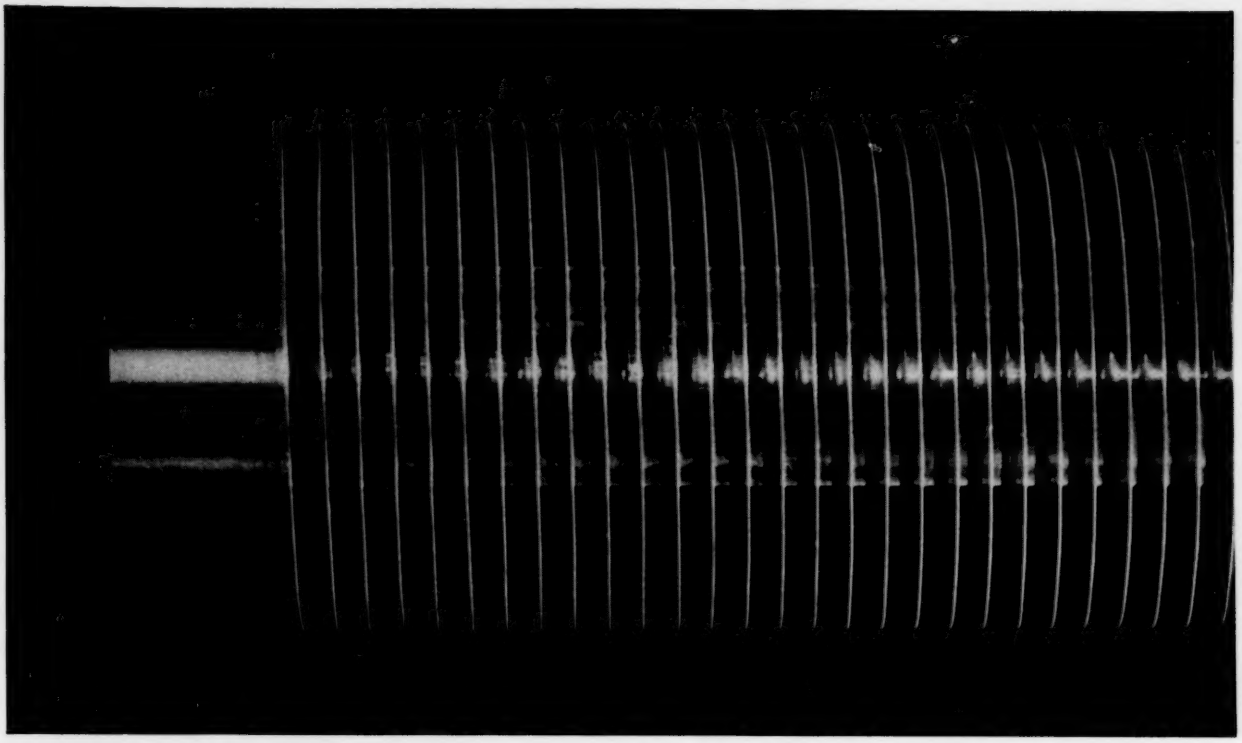
Increased demand for industrial, commercial and residential electric power could cause the United States' generating capacity to exceed the 1 trillion kilowatt-hour mark in 1963, says James H. Jewell, vice-president in charge of marketing for the Westinghouse Electric Corporation. He outlined market forecasts for homes, stores, and factories at the 25th annual sales conference of the Edison Electric Institute in Chicago, Ill. Using new construction forecasts to indicate commercial activity, Mr. Jewell said that $500 billion will be spent for new buildings in the next ten years. This does not include $250 billion more that will go into maintenance and modernization work. "Right now, the value of all the buildings standing in the United States is approximately $500 billion," he pointed out. "This means that as a country, in the next decade we will construct the equivalent of everything standing today; we'll be doubling our real estate investment." The value of electrical equipment needed for both new construction and modernization work will total about $108 billion.

Collection of all available methods of testing of windows, which will be evaluated in terms of such properties as air infiltration, rain leakage, heat transfer, and structural strength, is the first effort of Committee E-6, American Society for Testing Materials, committee on Methods of Testing Building Constructions. Development of methods of testing vapor barriers beneath concrete slabs-on-ground or in crawl spaces represents another new development. Chairman of the committee is R. F. Legget of the National Research Council of Canada, Ottawa.

Continuing a trend of the past several years, 5,400 hotel and motel pools were constructed during 1958. Such pools account for nearly one half of all non-residential pool installations in the U. S. National Swimming Pool Institute, Harvard, Ill., quotes American Motel, a trade magazine serving the motel industry, which conducted a survey showing that 14% of its readers are planning to install a swimming pool during the next two years. Its editors estimate that $40 million or more will be spent by motel owners during 1959 alone.

Arkla Air Conditioning Corporation will make available its gas air conditioning units for use by engineering colleges and universities at a special reduced cost for instructional purposes. Purpose of this program is to make it possible for the institutions to instruct their graduating engineers in the operation of its year-round gas units, and particularly in the heat absorption principle which they employ. The program is designed to permit local gas companies to cooperate in making the units available to colleges at little or no cost. Inquiries should be directed to Arkla Air Conditioning Corp., 812 Main Street, Little Rock, Ark.

Plans to conduct an extensive study of the marketing and distribution problems of building materials and equipment manufacturers have been announced by Producers' Council, Inc., Washington, D. C. The Council, whose membership numbers nearly 200 building product manufacturers and associations of manufacturers, has retained the services of two of the nation's leading marketing consultants. In explaining the purpose of this study, the Council points out that "While our efforts at increasing efficiency in the factory have been successful, we are nevertheless faced with the fact that costs to the consumer continue to rise. It has become more apparent that manufacturers must ask themselves the question, Has efficiency in marketing and distribution kept pace with increases in production efficiency?" Producers' Council was founded 37 years ago originally as a committee of the American Institute of Architects, and remains affiliated with that organization. It operates chapters in 42 major cities and conducts numerous programs designed to provide authoritative technical information concerning building materials and equipment.



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Write for Bulletin S-55

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WASHINGTON OVERTONES

by LORING F. OVERMAN

● With organizational matters out of the way, the 86th Congress is proceeding rapidly with the serious business of "must" legislation. Facing early action as the Easter vacation approached many projects of indirect but nonetheless pertinent interest to the air-conditioning, heating and ventilating industries.

● At the Administrative level, suppliers of both liquid and solid fuels, and equipment for their use, were affected by the President's order replacing the voluntary oil import program with mandatory controls. Features: March 11 was set as the effective date for control of imports of crude oil and unfinished oils; April 1 for finished products, including residual fuel oil.

Authority of the Secretary of the Interior is required to import petroleum products.

Mandatory controls will remain in effect indefinitely.

Captain Matthew V. Carson Jr., who headed the voluntary controls program, is in charge of the new plan.

The Trade Agreements Extension Act of 1958 authorizes such controls "to safeguard the national security." The President's action was based on arguments that the domestic petroleum industry is threatened by excessive imports to such an extent that its defense production capabilities would be impaired in the event of hostilities.

Same viewpoint, also pertaining to fuel oil imports, has been voiced by the National Coal Association.

● A $20-million program of coal research and development to be carried out by the Interior Department is to be the goal of legislation introduced in the house, and soon to be offered to the Senate. The Senate bill, to be introduced by Senator Gordon Allot (R-Colo.), is to be a companion measure to HR 3375, introduced by Representative John Saylor (R-Pa.).

Bureau of Mines would be directed to develop new and more efficient methods of mining and utilizing coal; to promote coal research and to establish technical advisory committees from industry to evaluate research proposals and avoid duplication of effort.

● Clashing overtones of political differences were forecast when the Senate Banking Committee approved and recommended passage of a bill providing $389,500,000 in loans and grants intended to stimulate business activity in economically depressed areas.

The President vetoed similar legislation in the 85th Congress, proposing for this session a measure authorizing $53-million.

The new proposals set up three loan funds of $100-million each to aid (1) industrial areas of high unemployment, (2) rural agencies of job scarcities, and (3) regions in need of public facilities to assist in attracting industry. Another $75-million for outright grants is provided, the balance being for miscellaneous and contingencies.

Opponents consider the proposals as subsidizing uneconomic business situations. Measure is considered to be a long way from passage.

● Government housing officials are still forecasting a drop in new home starts for later in the year. The high level January rate of 1,350,000 per year is considered due to continuing momentum from earlier periods.

A second-half slowdown could follow: (1) a shift to higher cost homes, or (2) a cut in bank lending if demand for commercial loans picks up.

Housing starts during February rose a seasonal 3% to 89,000 units, 35% higher than February of 1958. This represents an adjusted annual rate of 1,320,000 units. New private dwelling units placed under construction in February totaled 87,900, compared to 83,300 in January.

Public housing starts from 2,700 in January to 1,100 in February.

(Continued on page 8)

in Disc Equipped Bronze Valves

LOOK at that Wheel — Tough malleable iron. Design unequalled for cool, sure grip.

LOOK at the Index Plate — Has Fig. No. etched in green background. Held by wheel nut which is secured by rolled-over spindle end.

LOOK at that Spindle — Made of high tensile bronze. See how much heavier it is . . . how many more deeply cut threads engage bonnet. And, the crowned head that reduces friction on disc holder. Sure, it costs more to make a spindle this way. But it reduces wear, preserves packing, means easier operation.

LOOK at the Packing Nut and Gland—Note the heavy and deep bronze hex. And, that bronze gland designed to compress packing toward spindle.

LOOK at that Packing Box — Its depth equals 1½ times spindle diameter. More packing space means less repacking. An asbestos, lubricated and graphited packing is used.

LOOK at that Bonnet — One-piece, screw-over design with big hex surfaces is easy to remove. Take an extra look at the bevel joint between bonnet and body, serving as an internal brace against the crushing effect of the bonnet assembly. Millions of Fig. 106-A in use for years prove this unique design licks distortion and springing.

LOOK at the Disc Holder — It's the Slip-on Stay-on type originated by Jenkins. Correct protective depth prevents flaking or cracking of disc.

LOOK at the Disc — Easily renewed without removing valve from line. Made of compositions to suit various services . . . and **made by Jenkins**, the only maker of both valves and discs.

LOOK at that Body — Just compare wall thickness of this high tensile bronze body with any other valve. The factor of safety is many times higher than rating requires. See the curved diaphragm to protect seat from distortion by pipe strain. Note that the raised seat is higher to permit more reseating operations . . . and wider, so it won't cut into disc. Pipe threads are full length and clean cut.

LOOK at this . . . for Throttling

—Just replace the standard disc nut with this Throttling Nut and a Fig. 106-A becomes well-suited to throttling service. This unique nut reduces the effects of wire drawing and its long legs restrict flow for accurate control. Many plants take advantage of this versatile valve to reduce valve and parts inventory.

THE FIRST renewable composition disc valve was a Jenkins Valve, originated nearly a century ago. Compare today's Fig. 106-A Bronze Globe with any other. See why so many valve users agree that a *Jenkins* is still the FIRST for top value. For descriptive folder No. 189-B on the full line of Jenkins Bronze Globe, Angle and Check Valves write to Jenkins Bros., 100 Park Avenue, New York 17.

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JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES

WASHINGTON OVERTONES *(Continued from page 6)*

Private housing starts for the year are expected to top 1.2-million, with some estimating 1.3-million.

● Air-conditioning and heating-ventilating people active in supplying the government will be interested in a bill (S1383) to require the use "to the greatest practicable extent" of competitive bidding in the award of government contracts.

The bill has been introduced by Senator John A. Williams (R-Del.), co-sponsored by Senators Bridges, Allot, Mansfield and Dworshak. Included in the bill are provisions making it mandatory for the Federal Government to advertise for bids and award contracts on a strictly competitive basis. It provides that the contract must automatically be awarded to the lowest responsible bidder, with exceptions made only in those instances where advertising for bids would not be feasible from the standpoint of national security.

Mr. Williams predicted that the legislation "would unquestionably save millions of dollars annually."

● Wrangles over the omnibus housing bill have further emphasized the "spend-economize" differences existing within Congress. Despite the protests of would-be budget-balancers, mid-month found the measure well on its way through both Houses. Veto was considered possible, but supporters of the measure were claiming sufficient backing to over-ride.

Viewpoint of the budget-conscious was ably expressed by Senator Harry F. Byrd, (D-Va.), chairman of the Senate Finance Committee and Congressional Joint Committee on Nonessential Federal Expenditures.

Effect of the housing and airport construction bills recently passed by the Senate, he said, "would be to provide for back door expenditures of $3.3-billion before the first appropriations bill is even reported from the House Appropriations Committee."

The housing bill, as passed by the Senate would, according to the Senator, "completely bypass the appropriations process, and circumvent effective appropriation control over $2¼-billion in contract authorizations. No one can foretell at this date what the effect of these bills would be on expenditures in the coming and subsequent fiscal years, but this type of fiscal legislation outside of annual appropriation control makes a shambles of orderly efforts to keep the budget in balance."

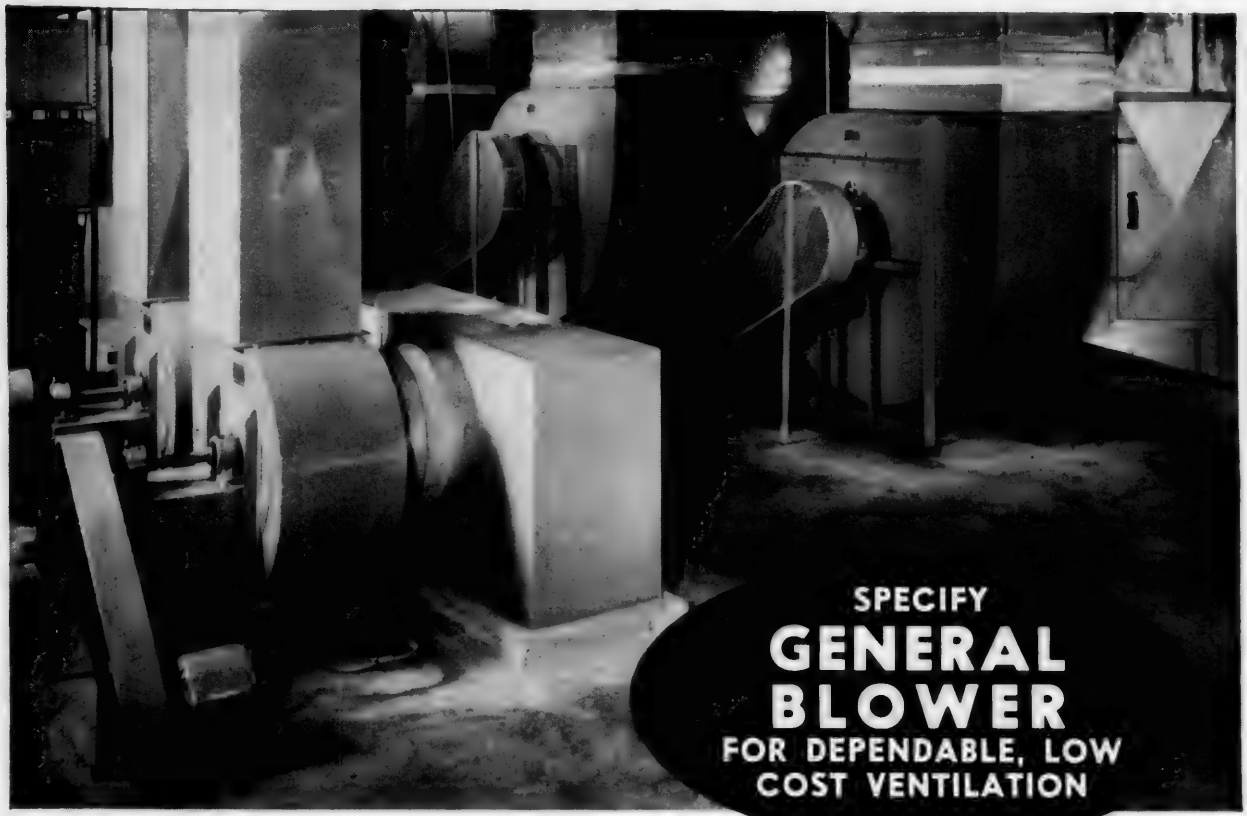
● Chief concern of the "anti's" in the spending debate is that early passage of the expanded housing bill would set the stage for other costly programs involving huge subsidies for teachers' salaries and school construction, public power development, agriculture, and area re-development in low-income communities.

● Doubling of the present program of Federal aid for development of water pollution control facilities is proposed by HR 3610. Representative Blatnik (D-Minn.), author of the bill, said, "Effective control and abatement of the serious stream pollution problem can be accomplished only through expanded treatment plant construction. This requires Federal assistance to hard-pressed communities. Independent studies show the need for $6-billion worth of local treatment plant construction over the next 10 years, requiring $1-billion in Federal aid."

● Legislation proposing to reduce to 5% the excise tax on self-contained air-conditioners has been introduced in the House by Congressman Herlong (HR 5206). Senator Javits has introduced a companion bill.

● Senate Bill S 1342 (Javits and Clark) proposes to create a Federal Limited Profit Mortgage Corporation to assist in providing housing for moderate income families and for elderly persons.

● Legislation permitting rapid depreciation to be taken for all devices and equipment for the collection at the source of atmospheric pollutants and contaminants is proposed in HR 1277, introduced by Rep. McDonough.



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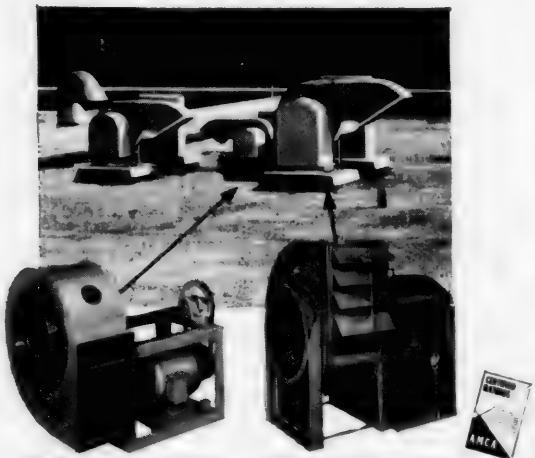

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BRIEFLY STATED

WITH THE ENGINEERS

Appointment of H. Corbyn Rooks to vice-president, engineering, at THE TRANE CO., La Crosse, Wis., is announced. He succeeds Ray E. Lucy, who retired March 1. Mr. Rooks takes charge of the division responsible for the firm's multi-million dollar product development program, and also for the operation of the company's research and testing laboratories. He joined the company in 1934 as an engineer specializing in cooling coils. . .

Promotion of Albert A. Giannini to the position of assistant regional manager in northeastern United States is announced by CARRIER CORP., Syracuse, N. Y. Associated with the company for eighteen years, he is a past president of the New York Chapter, American Society of Heating Refrigerating and Air Conditioning Engineers. . .

A. D. WALKER & CO., INC., New York mechanical contractors, announce that the firm has formed BERTRAN-WALKER CORPORATION in Puerto Rico, with Anibal Martinez, of Santurce, P.R., as president. The new corporation will engage in the installation of air conditioning, ventilating, and plumbing systems in major Puerto Rican buildings, such as hotels, office buildings, and industrial plants. A. D. Walker & Co. will function in an advisory capacity and provide its experience to Bertran-Walker Corp., but the latter will employ skilled Puerto Rican personnel at all levels, a policy successfully employed by many major stateside corporations in the Caribbean. Bertran-Walker has already received the mechanical contract for the administration building and laboratory of the insular Water Resources Authority. . .

DETROIT CONTROLS DIV., AMERICAN-STANDARD, Detroit, Mich., has named John S. Amneus manager of research and advanced development; Richard L. Campbell, divisional director of engineering; and Thomas E. Noakes, chief engineer, Detroit products. . .

Charles A. Hathaway is appointed director of engineering of AIR IMPELLER DIV., THE TORRINGTON MFG. CO., Torrington, Conn. As chief engineer for the last seven years, he has supervised the expansion of the engineering department to 42 full-time personnel and a complete air impeller testing facility, including a sound laboratory. . .

Daniel B. Callaway has joined INDUSTRIAL ACOUSTICS CO., INC., New York, N.Y., and will supervise the company's West Coast activities and provide western regional engineering service for the company's noise control products. Formerly chief engineer of sound control department of The Koppers Company, he had been supervisor of noise and vibration control section of the Physics Research Department of Armour Research Foundation.

ENGINEERING SOCIETIES

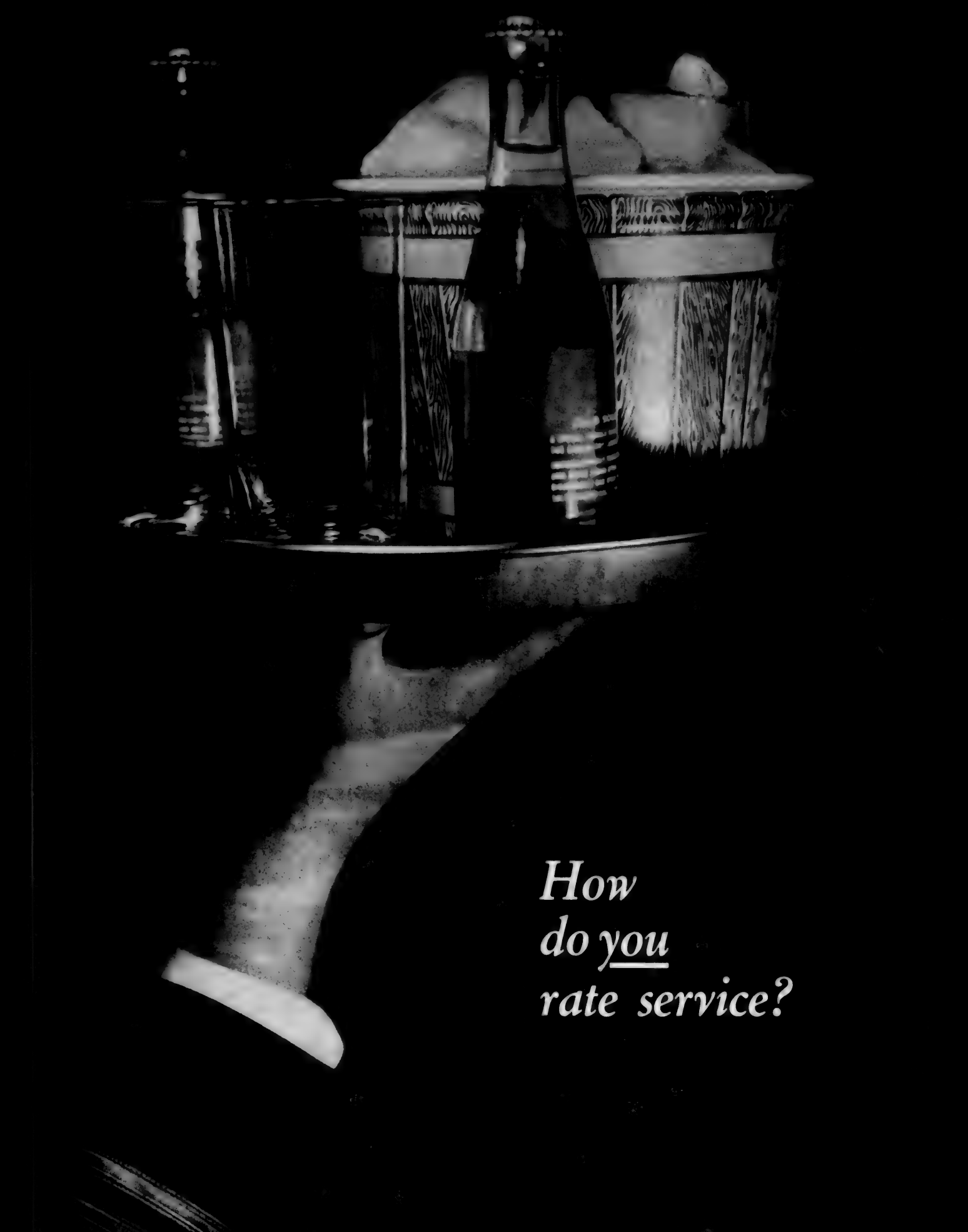
ENGINEERS JOINT COUNCIL, New York, N.Y., announces its officers for 1959: Enoch R. Needles, president, will serve another term. Dr. Augustus B. Kinzel became vice-president; Lawrence Chandler, treasurer; E. Paul Lange, secretary; and L. K. Wheelock, assistant secretary. EJC welcomed the CONSULTING ENGINEERS COUNCIL, a national federation of state bodies of consulting engineers, as an affiliate member. The 1959 Nuclear Congress, to be held in Cleveland, Ohio, from April 5 to 10, is sponsored by more than 30 engineering societies and independent organizations. Coordinated by EJC, the meeting is devoted to the peacetime uses of atomic energy. Concurrent with the Congress will be an exposition, called the Atomfair, at which manufacturers will demonstrate the latest products and services for the nuclear field. . .

Sessions on the choice of materials in design, mechanical aspects of design, and power and control in design will be featured at the fourth annual Design Engineering Conference, sponsored by the machine design division of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS. The conference is held concurrently with the Design Engineering Show, produced by Clapp & Poliak, Inc., New York City. Both events will take place at Convention Hall, Philadelphia, Pa., May 25 to 28, inclusive, with conference sessions in the morning and the show in the afternoon. . .

The Cleveland Chapter, AMERICAN INSTITUTE OF INDUSTRIAL ENGINEERS, is conducting its 8th Annual Spring Conference on April 17. The theme is "Preparing to Measure Tomorrow", with topics that emphasize the specific, rather than the general. Registration is from 8:00 to 9:00 a.m, and sessions from 9:00 a.m. to 9:00 p.m. To be held at the Cleveland Engineering and Scientific Center, 3100 Chester Ave., Cleveland, further information may be had by writing H. E. Norton, Axle Div., Eaton Mfg. Co., 739 E. 140 St., Cleveland. . .

Three new directors, representing regions of the NATIONAL ASSOCIATION OF CORROSION ENGINEERS, have been elected for three-year terms. T. R. B. Watson, founder of Corrosion Services Ltd., Toronto, Canada, will represent the Association's Canadian Region. The South Central Region will be represented by J. C. Spalding of Sun Oil Co., Dallas, Tex. E. F. Moorman, research engineer with International Harvester Co., Chicago, Ill., will represent the North Central Region. The latest developments in processes, materials, methods, and equipment for corrosion control will be displayed at the 1960 Corrosion Show, to be held in Dallas Memorial Auditorium in conjunction with the 16th Annual Conference of NACE, March 14 to 18, 1960. Additional information can be had by writing R. W. Huff, Jr., exhibition manager, 1061 M&M Building, Houston 2, Tex.

(Continued on page 14)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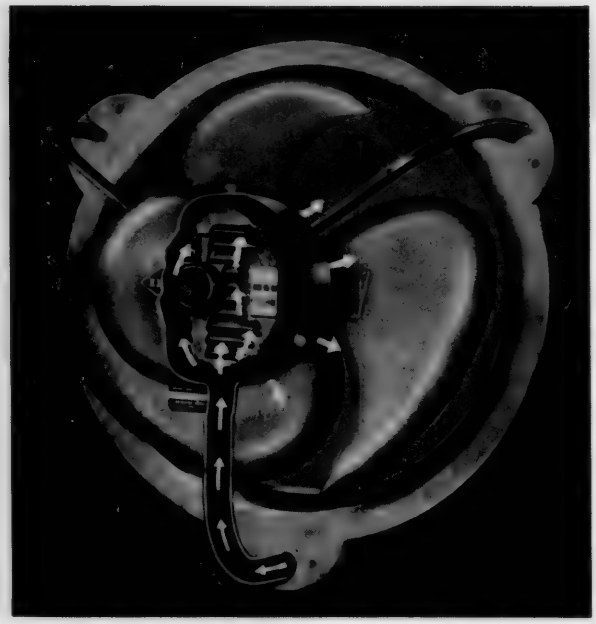
rate service?

when it's length of service . . .

Every day you find more hotels and motels installing Ilg electric ventilating equipment. Recently 161 more of these institutions turned to Ilg.

Why this growing preference for Ilg? Some of the reasons are shown below. Ilg fans and ventilators—car-

Here's why ILG *propeller fans last a lifetime*



Cool, Clean, Quiet. With Ilg propeller fans you get the operating cost advantages of *open-type* motors plus the protection of *totally enclosed* motors. Vent pipe brings in outside air to *pressure-cool* single-phase permanent-split capacitor and 3-phase motors. Casing protects motor windings against deposits. "One-Name-Plate" guarantee covers *both* fan and motor.

***Finger-Tip* Control.** Ilg Type "Q" propeller fan wheels and motors are dynamically balanced to assure vibration-free performance. Ilg-built self-cooled, direct-connected, permanently lubricated motors always run cool, clean and quiet.

For fans built to satisfy your "specs". . .

Each Ilg product shown carries the rating seal of the Air Moving and Conditioning Association Inc.

Ilg ventilating equipment rings the bell with 161 hotels and motels

rying a "One-Name-Plate" pledge of performance on complete unit—ring the bell with consulting engineers and building owners and operators because: Ilg products guarantee proper ventilation . . . cost little to operate . . . need virtually no maintenance for years and years.

For further details on the complete line of Ilg electric ventilating equipment, send for Catalog No. 159 on propeller fans, Bulletin No. 257 on *airfoil* centrifugals, Bulletins Nos. 2302 and 2701 on power roof ventilators.

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Offices in 57 Principal Cities
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BRIEFLY STATED

(Continued from page 10)

WITH THE ASSOCIATIONS AND INSTITUTES

E. F. Burow, Toledo, Ohio, was elected president of AIR FILTER INSTITUTE at its annual meeting in Philadelphia. Other new officers include: E. F. Snyder, Minneapolis, first vice-president; W. B. Watterson, Cleveland, second vice-president; and Arthur Nutting, Louisville, secretary-treasurer. Subjects discussed were a new code of ethics, Underwriter Laboratory standard and standardization of efficiency ratings, capacity ratings, and test procedures for electronic air cleaners. Members of the Institute are continuing to provide financial support for air cleaning research program conducted by the American Society of Heating Refrigerating and Air Conditioning Engineers. (The Institute was originally the Air Filter Association, founded in 1928; was changed in 1938 to the National Association of Air Filter Manufacturers, and in 1942 adopted its present name.). . .

COPPER AND BRASS RESEARCH ASSOCIATION, 420 Lexington Ave., New York 17, N.Y., announced an award competition to honor the year's most significant advancement in the use, application, or metallurgy of copper, brass, bronze, or other copper-base alloys. Winner of the competition will receive one thousand dollars and a bronze award to be presented on May 13 at the Association's annual meeting at The Homestead, Hot Springs, Va. The contest is open to anyone in the United States except members of the copper and brass industry. Primary consideration will be given to originality of design in the use or application of copper or its alloys, contribution to expansion or creation of markets, development of new products, contribution to the metallurgy or production techniques of these metals, or their contribution to the advancement of science and research.

BURGEONING BUSINESS

Establishment of a district office in Philadelphia, Pa., at 1420 Walnut St., is announced by INDUSTRIAL DIV., JOY MFG. CO., manufacturers of air compressors, dust collectors, fans, and conveyors. . . CRANE CO., Chicago, Ill., will discontinue production of cast and malleable iron screwed fittings and unions. The company's studies convinced it that it would be more economical for them to purchase these items, and it has already established dependable sources of supply to meet its continuing merchandising requirements. . . RICHMOND PLUMBING FIXTURES DIV., RHEEM MFG. CO., has opened new district offices at 370 Lexington Ave., New York City. . .

BRIDGEPORT BRASS CO., Bridgeport, Conn., plans to build a plant in Moultrie, Ga., for manufacture of tubular plumbing goods. Plant and equipment will represent an investment in excess of $500,000. . .

ANSUL CHEMICAL CO., Marinette, Wis., has become nationwide sales agents for Ucon Brand refrigerants, according to a joint announcement made recently by Ansul and UNION CARBIDE CHEMICALS CO., New York, N. Y. Ucon refrigerants are produced by Carbide at a new 50-million-pounds-per-year plant at Institute, W. Va. Under terms of the agreement, all Carbide's forty-six warehouses will be made available for storage of refrigerants and shipment to refrigeration parts wholesalers. . .

Colonial Supply Co., 217 Water St., Pittsburgh, Pa., has been appointed a distributor of its PVC plastic pipe, it was announced by A. M. BYERS COMPANY. Already a distributor of the company's 4-D wrought iron pipe, Colonial will distribute the PVC pipe throughout the Pittsburgh-tri-state area in cooperation with Byers' Pittsburgh Division.

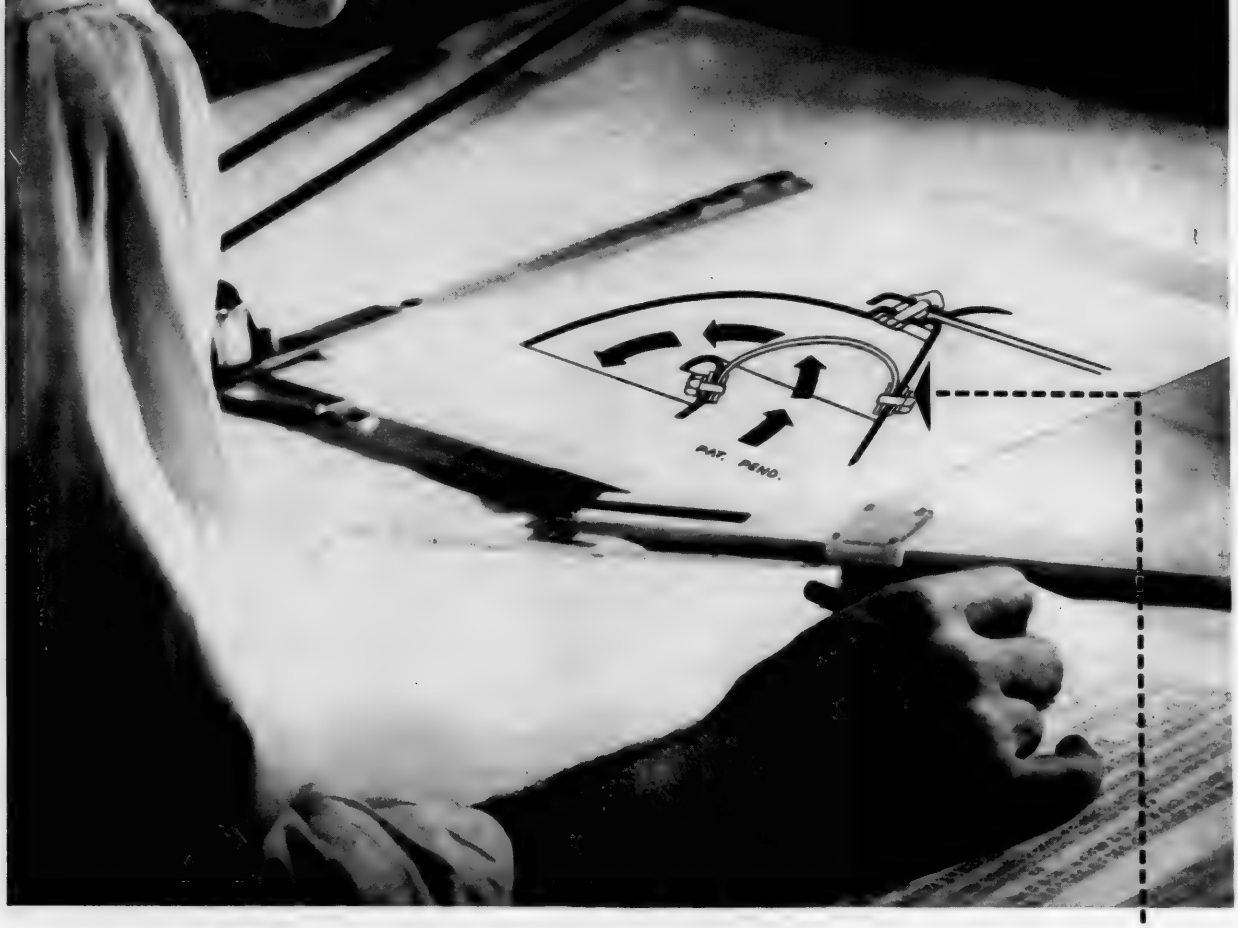
AIR HEATERS INC., Youngstown, Ohio, is a new firm organized to "provide a service that begins with the basic (industrial) heating problem and includes all design and construction work of a wide range of standard heated air applications and the complete engineering of special heating systems." President is Arthur A. Olson, a leading heating engineer. T. F. Schilling, treasurer, and John Wehmhoff, secretary, are principals of Manufacturers & Fabricators, Inc., industrial heating equipment manufacturers. Lee Wilson, member of the board, is the founder of Lee Wilson Engineering Co., Inc., producer of annealing furnace systems. New offices are at 1004 Mahoning Bank Bldg., Youngstown 3. . .

CARLON PRODUCTS CORP., Aurora, Ohio, has purchased the assets of United Pipe and Tube Company, Lubbock, Tex. The facilities will be operated under the Carlon name, and will serve the west Texas area with the company's plastic pipe and fittings. The plant will also produce plastic-coated-steel underground pipe for gas distribution, electrical conduit, and all applications requiring corrosion-free metal pipe. Purchase of the Lubbock plant is a part of Carlon's current expansion program, which during the past six months has included construction of new million-dollar facilities at the Aurora headquarters and construction of a new extrusion plant in Compton, Calif. . .

Marking the firm's entry into the manufacture of a complete line of hydrostatic shock controls, over 50 manufacturers representatives of JAY R. SMITH MFG. CO. recently attended a two-day engineering and sales seminar at the company's research laboratories and plant at Union, N.J. Attending a ground-breaking ceremony for two new buildings being erected for the company, Jay R. Smith, president, announced that shock controls are but one of several new product developments being added to the company's line. . .

COMBUSTION ENGINEERING, INC., New York, N.Y., has acquired General Nuclear Engineering Corp., a leading nuclear engineering and consulting firm headed

(Continued on page 154)



Engineered Silence

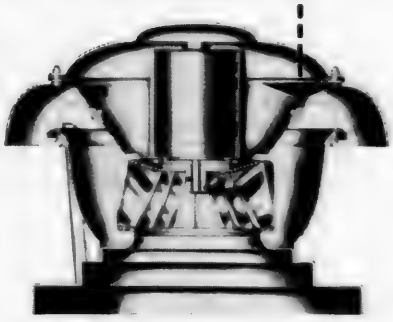
U-spring suspension absorbs 44% more vibration than rubber isolators

...and only Jenn-Air Exhausters have it!

There are two reasons why vibration isolation is a critical factor in exhauster design. *First,* any reduction in vibration results in a corresponding decrease in noise—an important consideration in restaurants, schools, hospitals and similar installations where quiet operation is a must. *Second,* excess vibration causes wear and tear on motors, blades and other moving parts, cuts exhauster life expectancy.

Research at Pittsburgh Testing Laboratory has proven that, compared to rubber mountings, U-springs reduce vibration by 44%. An exclusive Jenn-Air engineering development, U-spring suspension absorbs vibration more effectively because it compensates for both radial and lateral movement. Furthermore, Jenn-Air U-springs are *guaranteed for life!* They are made of stainless steel so they will not wear out—ever. More than 75,000 Jenn-Air units are now in service without one case of suspension breakdown.

Gain the benefits of less noise and longer life: When you specify power exhausters, make it Jenn-Air. Available in a complete range of centrifugal and axial blade models for roof or wall installation. Air-moving capacities from 175 to 22,700 cfm. Request full line Bulletin 58-B.



JENN-AIR

Jenn-Air Products Co., Inc.
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Member of Air Moving and Conditioning Association

Scientific Frontiers

• Procter & Gamble Co. is using high-speed movies as a new tool in dust control. Speaking before 3000 occupational health specialists attending the Industrial Health Conference in Chicago, R. J. Beaman, industrial hygienist for the company, showed that when a dust leak occurs in a dust control system, it is often difficult to locate the source of leaking dust by air sampling techniques. Furthermore, there are many dust hood installations that could be more simple if the exact dust source and its pattern were known. High-speed photography enables an investigator to know where the dust is coming from and where it goes; the shape of a dust cloud and dust sources due to maladjustment of equipment are readily seen. A high-speed camera ranging from 500 to 3000 frames per second costs approximately $2000. When one compares the cost of hoods, enclosures and ducts which may not be necessary, or are not doing the proper job due to incorrect design, as shown by the high-speed camera. Mr. Beaman concludes that the cost of the photographic equipment becomes negligible.

• The Bureau of Mines has announced plans for releasing, with an atomic explosion, the trillions of barrels of oil held in Western shale beds. R. M. Gooding, of the Bureau, said no specific target date has been set for such a program, the purpose of which would be to (1) pulverize the oil bearing shale with an underground shot, and (2) then free the oil from the shale by man-made controlled fire underground. He said the initial experimental explosion is expected to produce 15,000 barrels of oil and 10,000,000 cubic feet of gas at the outset. Then the combustion process would continue to produce quantities of oil and gas. However, he stressed that success of any such plan for atomic oil mining must first be determined by the experimental shot. Shale deposit tentatively selected is in the Piceance Creek Basin in northwest Colorado and covers about 1200 square miles. All of the evidence at hand suggests that an experimental test site can be selected in this basin that will meet the criteria (established in September of 1957 in the first underground nuclear explosion, known as the Rainier test) for complete containment of the explosion and entrapment of the radioactivity in the fused material resulting from the reaction. Of course, any site considered will have to be evaluated in detail to assure the protection of public health and safety.

• Another application with great potential of cryogenics, the science of low-temperature phenomena discussed on this page last month, is the use of liquid nitrogen to preserve food for long distance shipments without refrigeration. As reported in *Kaiser Aluminum News*, the process involves freezing food down to minus 150 deg F in a special insulated container, using liquid nitrogen as a refrigerant. A full-scale shipment of vegetables, fruits and juices was made from Chicago to equatorial Venezuela. The insulated container, which had a 6000-lb capacity, had an aluminum inner liner and outer jacket, with six inches of insulation between them. After freezing and sealing, the container was shipped by rail in an unrefrigerated boxcar for four days to New York, and then had a 10-day trip in a non-refrigerated ship to Venezuela. There was no thawing of the food. Similar tests have been made with other nitrogen-frozen foods, including one in which ten tons of it was set directly in the path of a constant flow of 90-deg air. Checks made after six weeks showed the food had not thawed, and that the temperature of the block had risen to only 0 deg F.

In super-motels, "super 8's" and supermarkets...

Air-conditioned luxury is only a few feet from your car in today's super-motels. For travellers, air-conditioned super-motels like the one shown above are a home away from home—combining convenience, comfort, often such added attractions as air-conditioned lounges, playrooms and restaurants. Motels *without* air-conditioning just can't compete.

The men enjoy smoking cigars and, with air-conditioning in the car, the whole family enjoys the trip—with the windows up! Americans spent about $150,000,000 on automobile cooling equipment in 1958.

Shopping convenience and comfort—in one of the thousands of bright new air-conditioned supermarkets that make shopping so pleasant. Smart store operators know that air-conditioning increases sales volume.

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Here is a super quiet, super efficient, and super versatile heating and ventilating unit. This new McQuay Seasonvent large capacity unit is engineered specifically for applications such as school auditoriums, theatres and similar installations where smooth and quiet operation is a necessity.

This Seasonvent is available in nine sizes for low static applications (0″ to ⅜″) and seven sizes for high static applications (¾″ to 1¼″), with capacities ranging from 1250 to 15,000 cfm.

All McQuay Seasonvent models are equipped with highly efficient sound absorbing plenum sections with the fan motors internally mounted. They are available in horizontal, vertical or wall mounted arrangements.

For complete information on this new unit, contact the McQuay representative in or near your city, or write McQuay, Inc., 1619 Broadway Street N. E., Minneapolis 13, Minnesota.

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McQuay INC.

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IN TUBING, Nothing Beats Copper!

IN COPPER TUBING, Nothing Beats READING!

For COPPER WATER TUBE

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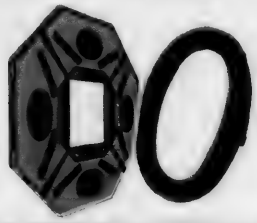

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Specify READING "LEKTROSEAL"®

Also Specify READING for–

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- Quality Controlled from Start to Finish

For FINNED COPPER TUBE Specify READI-FIN®

A line of heat transfer tubing made by Readi-Fin Mfg. Co., Inc. (a subsidiary of Reading Tube Corp., at Reading, Pa.). The extended surface is extruded from the tube wall, thus eliminating the possibility of fin failures resulting from thermal shock, corrosion and erosion. This "one-piece" (integral) construction provides maximum heat transfer efficiency, ruggedness, easy fabrication and freedom from fouling. It's available in Water Tube types with finned or plain ends and in Condenser Tube types with finned, plain or stripped ends.

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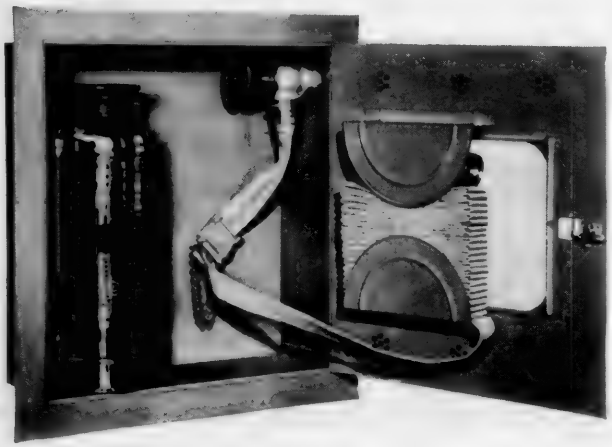
New! Fire hose cabinet with

RACK SWINGS FULL 180°

Now, when seconds count, there's no delay in fire-fighting . . . user just grabs the hose and runs! The hose is racked on the *door* instead of inside the cabinet. This door swings out—a full 180°—



NEVER FOULS HOSE LINE

and the hose can't snag when it's needed most. The new Allenco Hozegard cabinet is the first fire hose cabinet equipment to be *completely* Underwriters listed! Each Hozegard installation saves 25% to 30% by eliminating the expensive pin-type rack and the time needed to install the hose on it.

Allenco Hozegard cabinets are available with or without extinguishers and with Fire Department valve when desired. There is a choice of sizes and styles to fill most every requirement. All have steel cabinet with frame welded to body . . . hold up to 100 feet of 1½" linen hose. When specified with exclusive Hose Clip, the entire unit—cabinet and equipment—is 100% U/L listed.

SPECIFY ALLENCO . . . QUALITY FIRE PROTECTION SINCE 1887 • STANDPIPE EQUIPMENT • EXTINGUISHERS • HOSE • REELS • FIRE DEPARTMENT CONNECTIONS

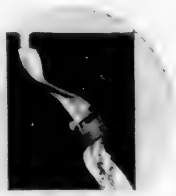
FOUL-PROOF door rack

NOTE TO THE DESIGNER

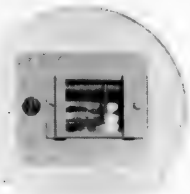
You'll appreciate the contemporary styling of Allenco Hozegard cabinets. Designed to complement interior decor, they actually blend with the beauty of your building.

Requiring 35% less area—less depth, the compact Hozegard cabinet can be flush-mounted in any wall, or in the floor! The cabinet door is available in several styles and choice of 3 trims . . . custom-finished at the factory or on-the-job to your specifications.

Free swinging door rack means foul-proof withdrawal and ready aiming at fire.



Exclusive hose clip makes cabinet semi-automatic—perfect for one-man operation.



Tamper-proof glass latch shield is scored for safe, easy breaking in emergency.

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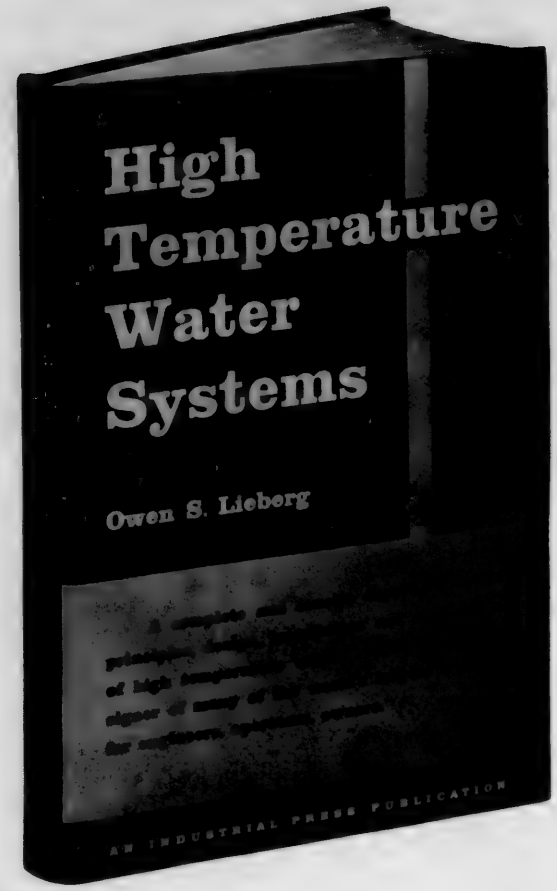

HIGH TEMPERATURE WATER SYSTEMS meets the need for an authoritative explanation of the principles, design and operation of high temperature water (HTW) systems.

The author is a distinguished international authority who served as consultant on the largest HTW system in England (Bicester Ordnance Depot) and such U.S. installations as the Forbes and Olmstead Air Force Bases and the Cross factory in Detroit. He also designed the HTW system for the largest military establishment in Canada.

The book contains original design data used successfully in actual systems. Tables, graphs, photographs and specifications serve as a working guide . . . and let you benefit from Mr. Lieberg's knowledge and experience.

A special feature is a full-chapter treatment of the design of a typical system . . . step by step . . . based on the principles developed in the book. After mastering this procedure, the engineer will have little difficulty in completing the design of *any* HTW system!

CONTENTS

1. **Advantages of High Temperature Water**
   Arguments for HTW. Brief history. Sample calculation comparing HTW to steam.
2. **Thermal Properties of Water**
   Basic thermodynamics. Units defined. Property tables for water and steam.
3. **Some Design Considerations**
   Temperature drop, system pressure, thermal storage, system flexibility, secondary steam.
4. **Pressurizing the System**
   Reviews pressurizing methods: Steam, air, inert gas. Special cases; heat-power systems.
5. **Boilers and Expansion Tanks**
   Boiler selection. Water tube boilers. Summer load conditions. Sizing expansion tanks. Nitrogen pressure tanks.
6. **Controlling the System**
   Combustion control for various fuels. Control panels. Water level and flow control. Btu meters.
7. **System Circulation Pumps**
   Great detail covering the "heart of the system." Guarding against flashing. Pump specs. Friction heads. Parallel pumps. Auxiliaries, drives, piping.
8. **Valves**
   Valve types and selection. Materials. Emergency closing valves. Valve sizing. Venting by air bottles.
9. **Piping**
   Heat flow capacity of pipes. Design temperature drop. Expansion loops and joints. Pipe sizing and insulation.
10. **Process Heating**
    HTW for process heating. Heat exchangers and converters. Valving and control for process.
11. **Space Heating with HTW**
    Unit heaters. Fan-coil systems. Radiant panels. Complete with application data for all systems.
12. **Applications**
    Describes numerous military and civilian installations in U. S., Canada, and Europe. Economic and design comparison with low temperature water and steam systems for similar situations.
13. **Designing a Typical System**
    Ten-step design procedure for any HTW system. Theory and practice summarized and applied to complete design example.
14. **Appendix**
    A complete specification of a typical boiler plant and auxiliaries for a high temperature water system.

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that are *just right!*

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United States Steel Export Company, New York

WHO WOULD DARE TO GAMBLE WITH HER SAFETY?

On one thing everyone is united: protection of the school age youngster. Woe unto the man who would gamble on the safety or health of the boys and girls who hold the promise of tomorrow!

But despite the fact that old America is solidly united on the need for protecting young America, some hazards, less obscure but no less real than traffic, fire or health dangers, are sometimes overlooked.

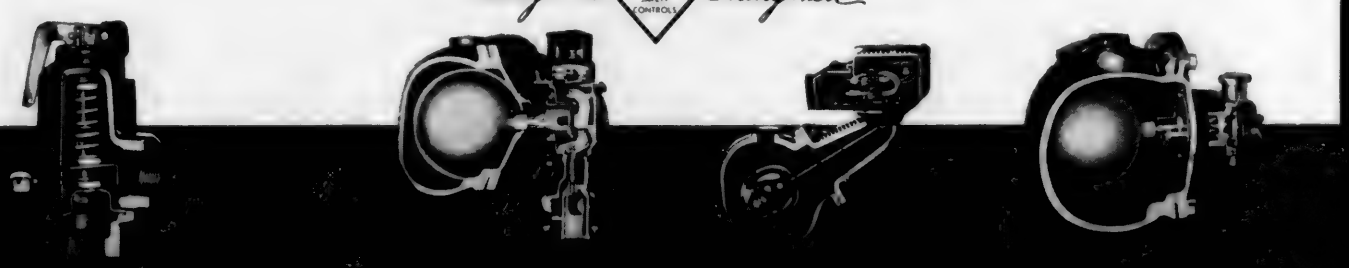
An excellent example is the unprotected heating or power boiler in school buildings. It is the duty of every heating man to point this out to the proper authorites.

No field is more receptive to your counsel. No field offers you a better opportunity to be of real service to your community.

There are McDonnell safety devices for every type and size of heating boiler and hot water plant found in schools, operating at any pressure up to 250 lbs. A number of them are illustrated here. Ask for complete catalog.

McDONNELL & MILLER, INC., 3500 N. Spaulding Ave., Chicago 18, Ill.

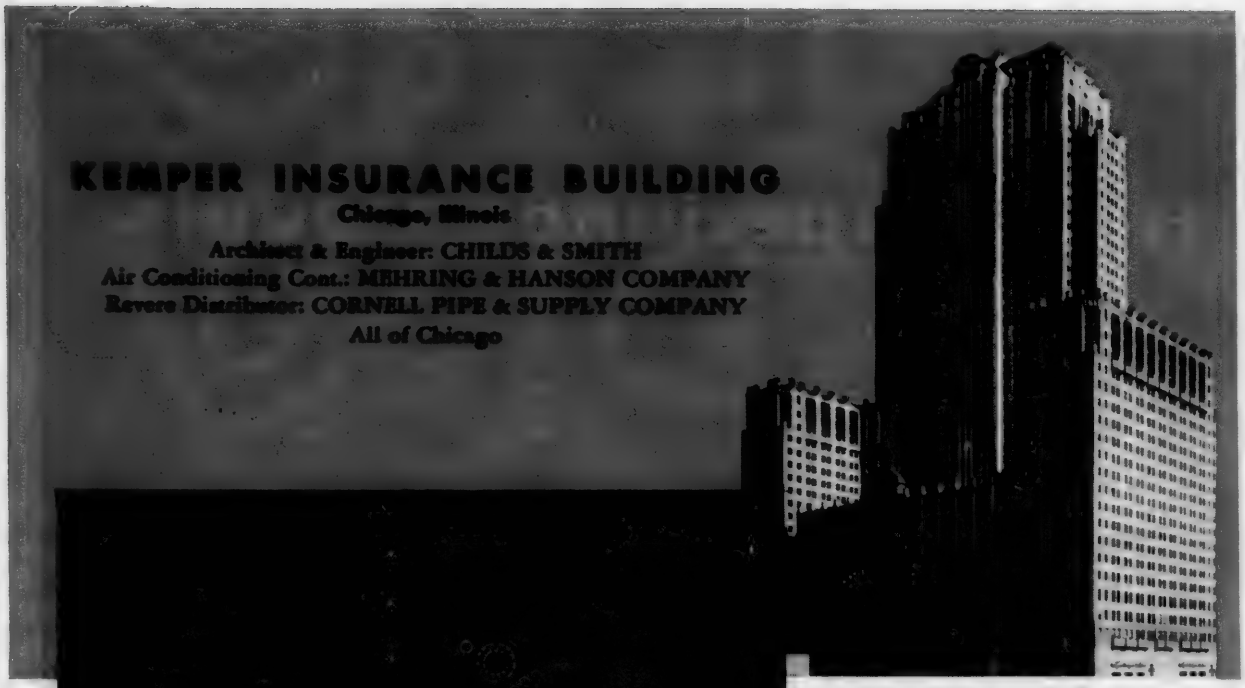
Doing One Thing Well



McDONNELL *Boiler Water Level Controls*

"In air conditioning an existing building like this, copper water tube is so much easier and faster to work with it's bound to cost less to install than rustable pipe."

says J. E. McClellan, Vice President
MEHRING & HANSON COMPANY, Chicago
to E. H. Cornell, President
CORNELL PIPE & SUPPLY COMPANY, Chicago


KEMPER INSURANCE BUILDING
Chicago, Illinois
Architect & Engineer: CHILDS & SMITH
Air Conditioning Cont.: MEHRING & HANSON COMPANY
Revere Distributor: CORNELL PIPE & SUPPLY COMPANY
All of Chicago

At left you see a typical detail of floor sleeves, duct risers, pipes and anchorage of the 2,500-ton refrigeration system installed in the 45-story Kemper Insurance Building.

Also shown is end elevation of installation at the fixture.

There are 3300 separate units air conditioning over 600,000 square feet of space.

The 92,050 feet of Revere Copper Water Tube are used for supply and return for hot water in winter and chilled water in summer. Condensing water is supplied from the Chicago River.

"In fact, because of the nature of the job, the Revere Copper Water Tube we used cost *much* less to install than if rustable pipe had been used," continued Mr. McClellan.

"We used 88,050 feet of type K tube for the risers, in sizes ranging from ⅜" to 6", and 4,000 feet type L tube in smaller sizes for connecting at the fixtures. Add to this 3,300 separate air conditioning units and you can readily see that making all those connections with threaded pipe would have been a much more time-consuming and costly proposition than the soldering of copper tube.

"Another thing that must be considered when making an installation in an existing building is permanence and absence of leaks. With copper tube you can get tight, leak-proof joints every time, and you never have to worry about tearing out walls and partitions for replacement caused by rust."

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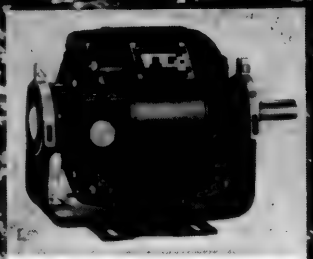

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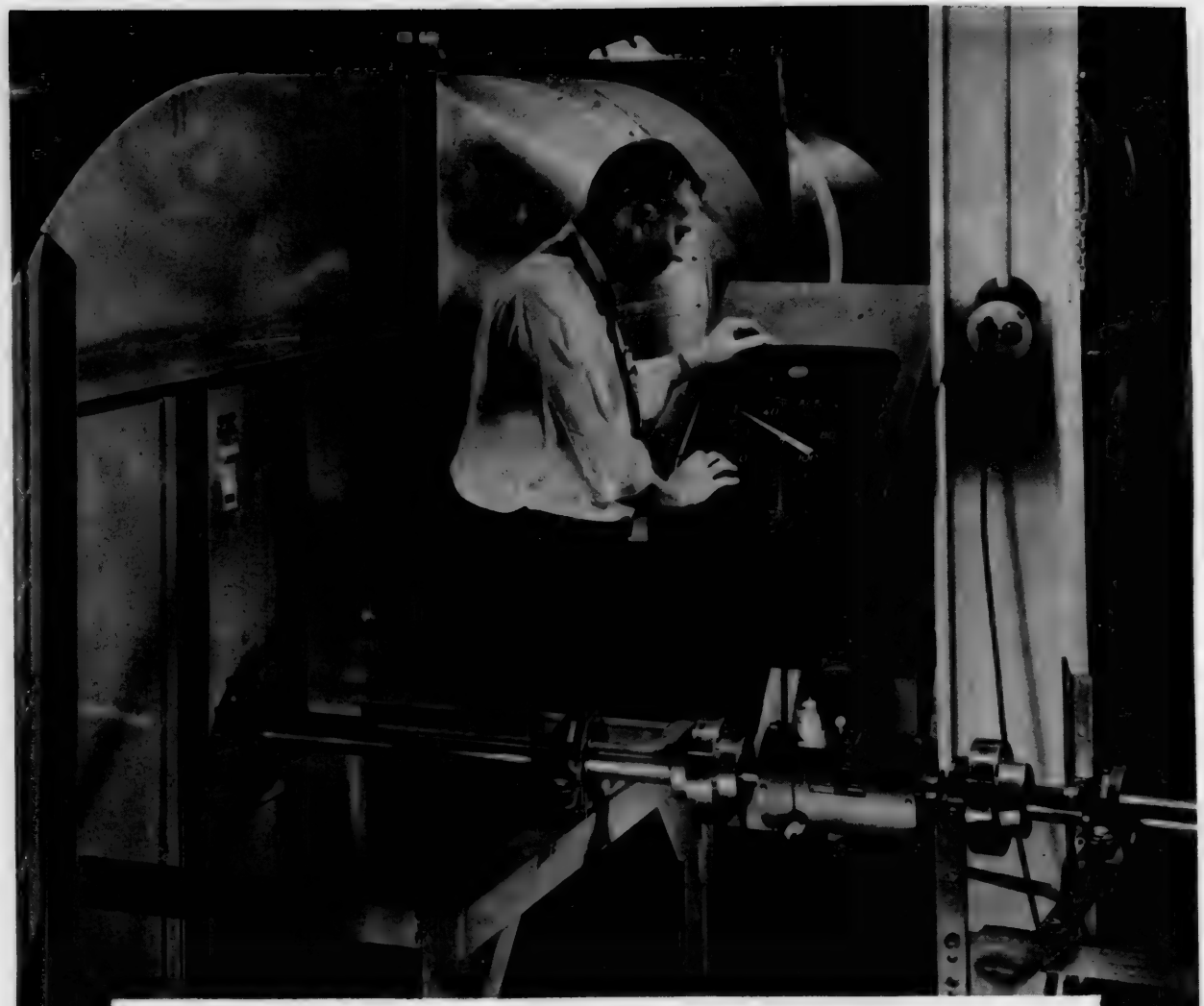

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close-coupled design

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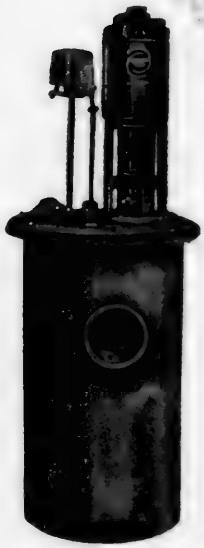

TYPE "UV" PUMP
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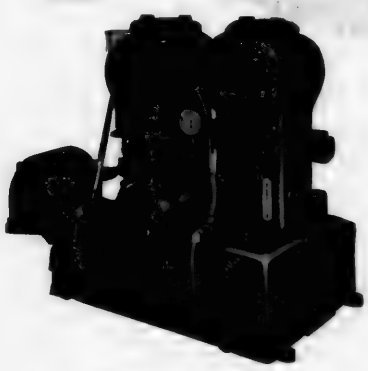

VACUUM PUMP
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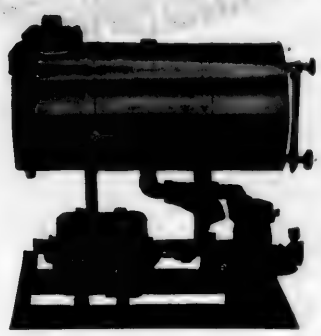

TYPE "TM" PUMP
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SKIDMORE PUMPS

SKIDMORE CORPORATION ST. JOSEPH MICHIGAN

Simplifying Field Survey Data
How to make a survey — Sample survey form

Basic Design Data
Design coordination — Design data form

Plumbing Codes
Code variations — Interpretation — Revising a code — National plumbing code

Footing Drains Around Buildings
Installation — Cleanouts — Sand interceptors

Location and Construction of Dry Wells
Sizing — Construction — Location

How to Install Drainage Piping in Fill
Compacted soil — Fill — Piping support

Function of Drainage Basins
Rainfall disposal — Dry Wells — Drainage basins

Protection of Site Utility Lines
Project utilities — Underground dangers — Trenching

Sub-surface Water Conditions
Piping arrangement — Waterproofing — Sewage ejectors

Design and Construction of Manholes
Location — Shape — Materials

Water Supply for Construction Projects
Responsibility — Piping — Installation — Connections

Access Space for Plumbing Fixtures
Design data — Advantages — Clearances

Wet Columns in Multi-story Buildings
Water and waste facilities — Spacing — Arrangement

Fixture Roughing for Low Rent Housing Projects
Typical layout — Space requirement — Economy

Vent Stack Terminal
Roof penetration — Flashing — Protection

Preventing Sewage Backflow in Buildings
System separation — Piping — Valves

Sump Pump Installations
Basins — Special conditions — Code compliance

Importance of Cleanouts in Building
Kinds of cleanout — Storm water

How to Install Exterior Cleanouts
Ground settlement — Grass surfaces — Paved top

Flexible Arrangement of Rest Room Facilities
Old and new buildings — Fixture roughing

Providing Access for Building Traps
Shallow installations — Concrete pits — Backwater valves — Watertight installations

Service Hot Water for Schools
Determining needs — Generation equipment — Storage

External Indirect Water Heaters
Capacity — Operation — Circulation — Supply

Two-Temperature Service Hot Water
Methods — Generators — Dual installation

Economy in Service Hot Water Generation
Condensate coolers — Storage — Piping

Supports for Hot Water Storage Generators
Location — Clearances — Sizing — Suspension

Water Hammer Arrestors
Water hammer causes — Methods of control — Devices

Balancing Service Hot Water Systems
Circulation — Upfeed systems — Valving — Controls

Interception of Volatile Fluids
Floor drainage — Fire hazard — Multi-story installations

Expansion in Hot Water Piping Systems
Expansion rates — Devices — Hangers — Anchoring

Increasing Water Supply Pressure in Buildings
Street mains — Tankless, pneumatic and roof tank systems

Gas Service for Multi-story Buildings
Distribution — Main support — Expansion — Safety

First Aid Fire Protection
Occupancy — Standard and extra equipment

Fire Protection for Apartment Houses
Standpipe system — Piping — Water supply — Hose stations

Fire Protection in Tall Buildings
Standpipe systems — Siamese connection — Fire pumps — Hose stations — Roof manifold — Roof tank

Parking Area Drainage
Methods — Sump pumps — Dry wells — Basins

Storm Drainage System for Flat Roofs
Rainfall intensity — Types of drain — Flow — Connections — Piping

Water Service for Research Laboratories
Distribution piping — Supply separation — Hot water systems — Laboratory benches

Emergency Protection of Laboratory Personnel
Emergency devices — Showers — Location — Types

Drinking Water Systems
Fountains — Coolers — Roughing in — Central systems

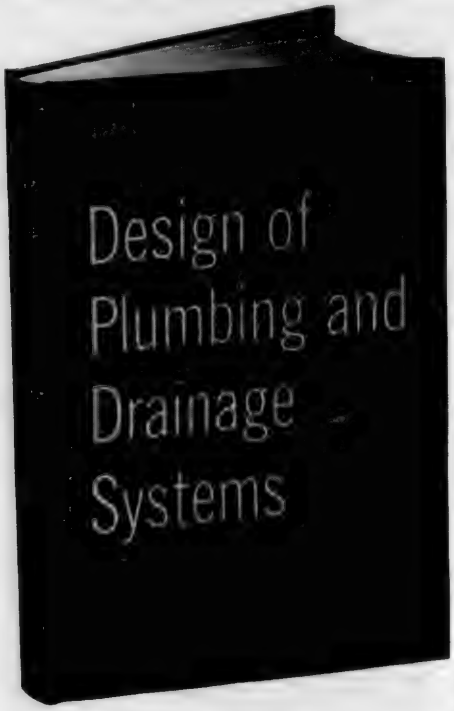
Distilled Water Systems
Distilling units — Storage tanks — Central systems

Fixtures for Mental Hospitals
Rest rooms — Lavatories — Water closets — Roughing in — Shower rooms — Private rooms

Plumbing Systems for Motels
Motel units — Arrangement — Access — Fixtures

Water and Drainage Facilities for Animal Quarters
Cage cleaning — Drainage — Waste systems

Draining the Planting Area
Interior areas — Roof areas — Exterior planting



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New high in combustion efficiency and fuel economy

with this revolutionary burner for medium size boilers

This compact Iron Fireman WhirlBlast unit combines many of the advantages of big burners, yet it requires little more supervision than the oil or gas burner in your home.

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Steadiest flame ever developed. In the new WhirlBlast firing head Iron Fireman engineers have solved the persistent problem of flame pulsation. A clean, steady, efficient flame is achieved without firebox vents or any other makeshift device.

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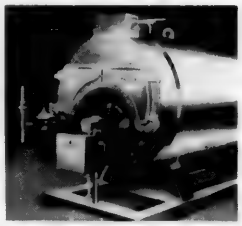
A true "package". When you bolt the WhirlBlast unit to the boiler front you install a complete forced draft firing system, combining air and fuel systems and integral electronic combustion controls. It leaves the factory as an operating unit, factory wired and tested. Does not require refractory combustion chamber, nor any provision for secondary air supply.

For all types of boilers. The WhirlBlast burner can be purchased in two ways: as a boiler-burner unit (shown at right), or as a burner alone for use in your present boiler.



Complete boiler-burner unit, ready to operate. Boiler and burner compose a single unit, engineered, assembled, wired and tested at the factory, carrying factory responsibility. Requires little more than service connections when delivered to the job. Sizes from 15 to 100 boiler horsepower.

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"For those investing in U.S. Savings Bonds under the Savings Fund Plan, each is averaging more than one $25 bond per month.

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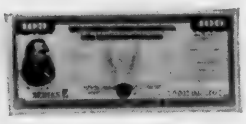

AIR CONDITIONING, HEATING AND VENTILATING

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Centrifugal Roof Ventilator provides quiet, high-volume ventilation. Streamlined, compact, easy to install. Inlet cones and wheel rims are aerodynamically correct, provide smooth air flow, quiet operation. Resilient mounting minimizes vibration. Unit shown has maintenance-free, weatherproof spun aluminum housing. Complete range of 16 fan sizes from 7″ to 40″ wheel.

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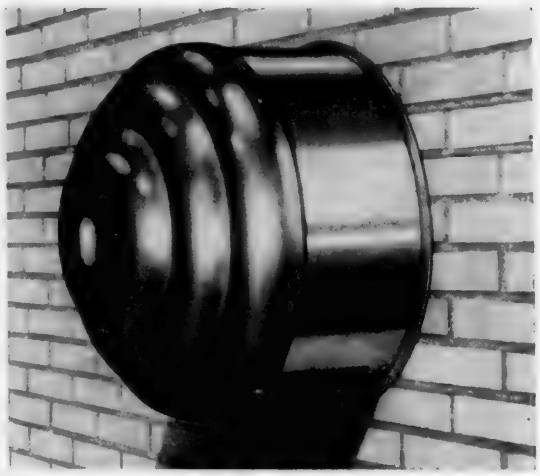

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Underground Heat Distribution Systems

How To Protect A System Against Failure

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Three major elements make up an underground heat distribution system: an inner pipe to convey steam, high temperature hot water, chilled water, condensate, etc., (type and size depending upon project requirements); the insulating of the inner pipe to minimize heat loss; and the outer casing to protect the insulation and inner pipe.

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Testing welded joints by applying a soap solution with the casing under 25 p.s.i.g.

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With the casing and joints sealed leak tight and protected against electrolysis and sub-soil acids he needs only one bit of . . .

Final Protection

Any system should be selected with this thought in mind:

"That some moisture will find a way into the system such as a rain storm prior to installation."

Therefore, to protect the system against any moisture that may get inside prior to final assembly, he specifies "that an annular uninterrupted air space must run the entire length of the system." With this feature and openings at ends of casing for draining and venting, he can force ventilate the system and dry it out. By necessity, the insulation must, of course, have an insoluble binder and be capable of returning to its original insulating efficiency when dry, even after a thorough saturation.

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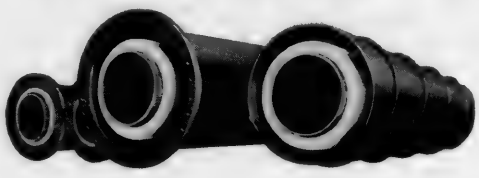
PIPING SYSTEMS



SPECIFY PERFORMANCE NOT PROMISES

Promised catalog ratings and actual on the job ratings are not always the same. When you specify "Buffalo" Fans you can always be sure that fan *performance* will confirm your good judgment. Buffalo Forge Company's 81 year reputation for highest engineering and manufacturing standards is assurance that you will obtain fan performance to meet the *exact* requirements of each job.

FOR HIGH PRESSURE REQUIREMENTS:

Designed especially for Class III and IV construction, the "Buffalo" Type "BLH" fan will provide peak performance for your high pressure systems. It affords a mechanical efficiency of 86% over a wide range, while maintaining stability of performance from free delivery to shutoff. The "BLH" features a smooth inlet bell, directional inlet vanes, backward-curved blades and divergent outlet. These factors reduce turbulence to a minimum, and give very quiet operation. An added feature is the non-overloading characteristic. Bulletin F-201 gives complete details.

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The "Buffalo" Type "BL" Fan is an ideal choice for your Class I and II ventilating and air conditioning installations. Its high static efficiency over a broad range has been proved in hundreds of applications. The "BL" has many of the unique "Buffalo" features of the "BLH": it is non-overloading, and is designed for minimum turbulence and ultra-quiet operation. Other features are the factory-balanced wheel to minimize vibration and the wheel-contoured housing with large, correctly-shaped scroll. Write for Bulletin F-104.

Only "Buffalo" offers you the "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.

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Buffalo, N. Y.

Buffalo Pumps Division • Buffalo, N. Y.
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"WE SECURED EVEN TEMPERATURES THROUGHOUT THIS 14-STORY BUILDING WITH SARCOTHERM HEATING SYSTEM CONTROLS,"

say Slingerland and Booss, architects and engineers

New York's "Avon House," completed in 1957, Architects and Engineers: Slingerland and Booss, 120 Greenwich Street, N. Y. C.

Mechanical Contractors: Fein-Schlosberg, Inc., 1770 Second Avenue, N. Y. C. Owner: The Ten Men Realty Co., Leon Finley, President, N. Y. C.

In the superbly appointed "Avon House" apartments at 340 East 74th Street, New York, the complete automatic heating control job is Sarcotherm. The architects and engineers, Slingerland and Booss, called on Sarco's experienced engineering department to work with them and the mechanical contractor in working out components—controls, vacuum pumps and steam specialties. Besides setting up undivided responsibility of one manufacturer, this policy assured a balanced system with no weak links.

Accurate orifice calculations by Sarcotherm insured proper distribution of subatmospheric steam in the system, even in mild weather. Each of the 2 zones of this building is controlled by a Sarcotherm Continuous Flow Modulating Steam Control Valve. These valves meter the steam to furnish proper heat at any given outside temperature. Control Valves are influenced by outside temperature, wind velocity, and solar radiation, plus differential steam pressure between supply and return mains. A Master Control Panel supplies complete programming operation with automatic control for day, night and morning pickup cycles.

There is ample testimony to the sound judgment of the architects in making this a complete Sarcotherm vacuum heating control system. Since its first day of operation the installation at the new Avon House has been 100% trouble-free.

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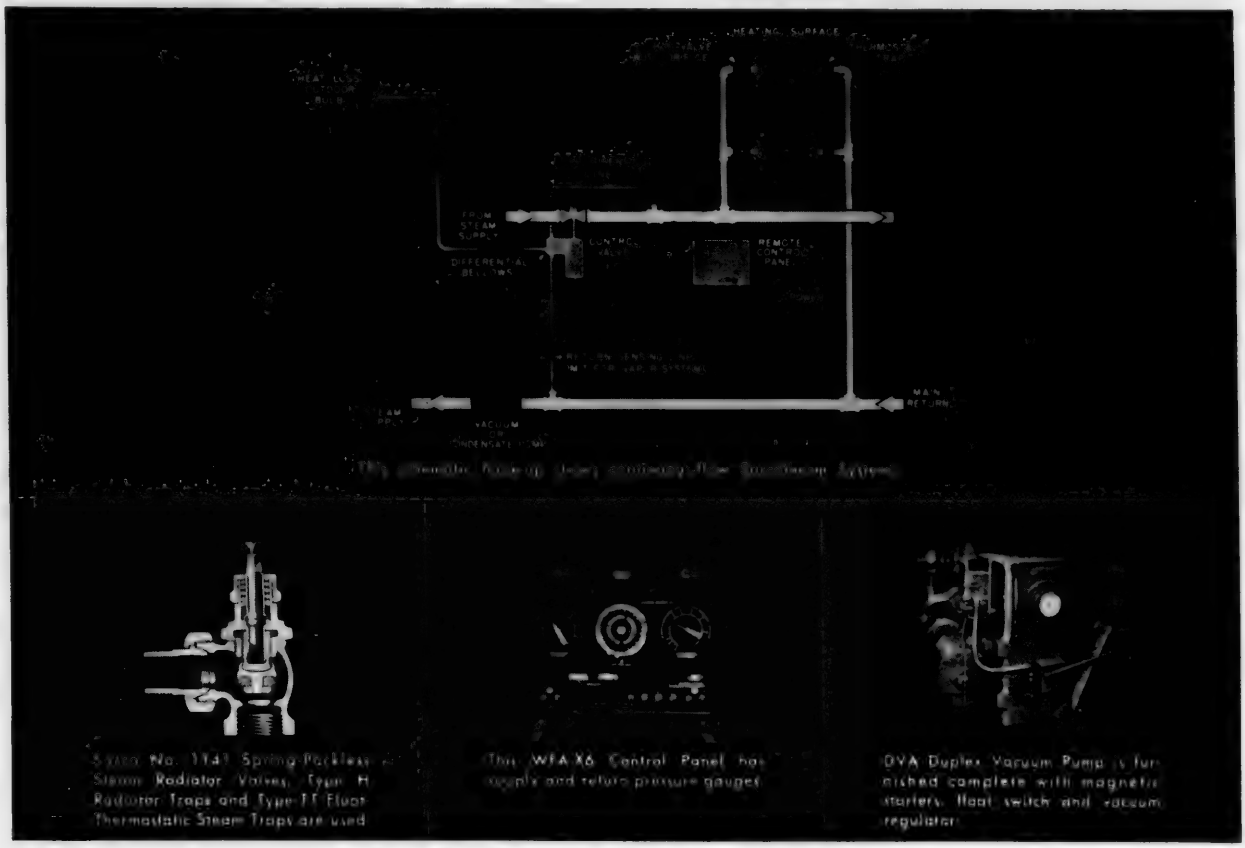
"INSTALLATION WAS EASY, THANKS TO SARCOTHERM ENGINEERING SERVICE AND UNDIVIDED RESPONSIBILITY FOR CONTROLS, SPECIALTIES, PUMPS," *say Fein-Schlosberg, Inc., mechanical contractors*


HEATING SURFACE
FROM STEAM SUPPLY
CONTROL VALVE
REMOTE CONTROL PANEL
DIFFERENTIAL BELLOWS
MAIN RETURN
VACUUM CONDENSATE RETURN
Sarco No. 1141 Spring-Packless Steam Radiator Valves, Type H Radiator Traps and Type FT Float Thermostatic Steam Traps are used
This WFA-X6 Control Panel has supply and return pressure gauges
DVA Duplex Vacuum Pump is furnished complete with magnetic starters, float switch and vacuum regulator

Marked advantages were found by the mechanical contractors in the quality of orifice engineering provided by Sarcotherm. Every valve, for example, was calibrated and the orifice plate brazed in at the factory. All units were tagged, unit-packaged, and keyed in with the hook-up drawing. The installation was supervised by Sarcotherm engineers. The installation was rapid and easy. No on-the-job adjustments were necessary.

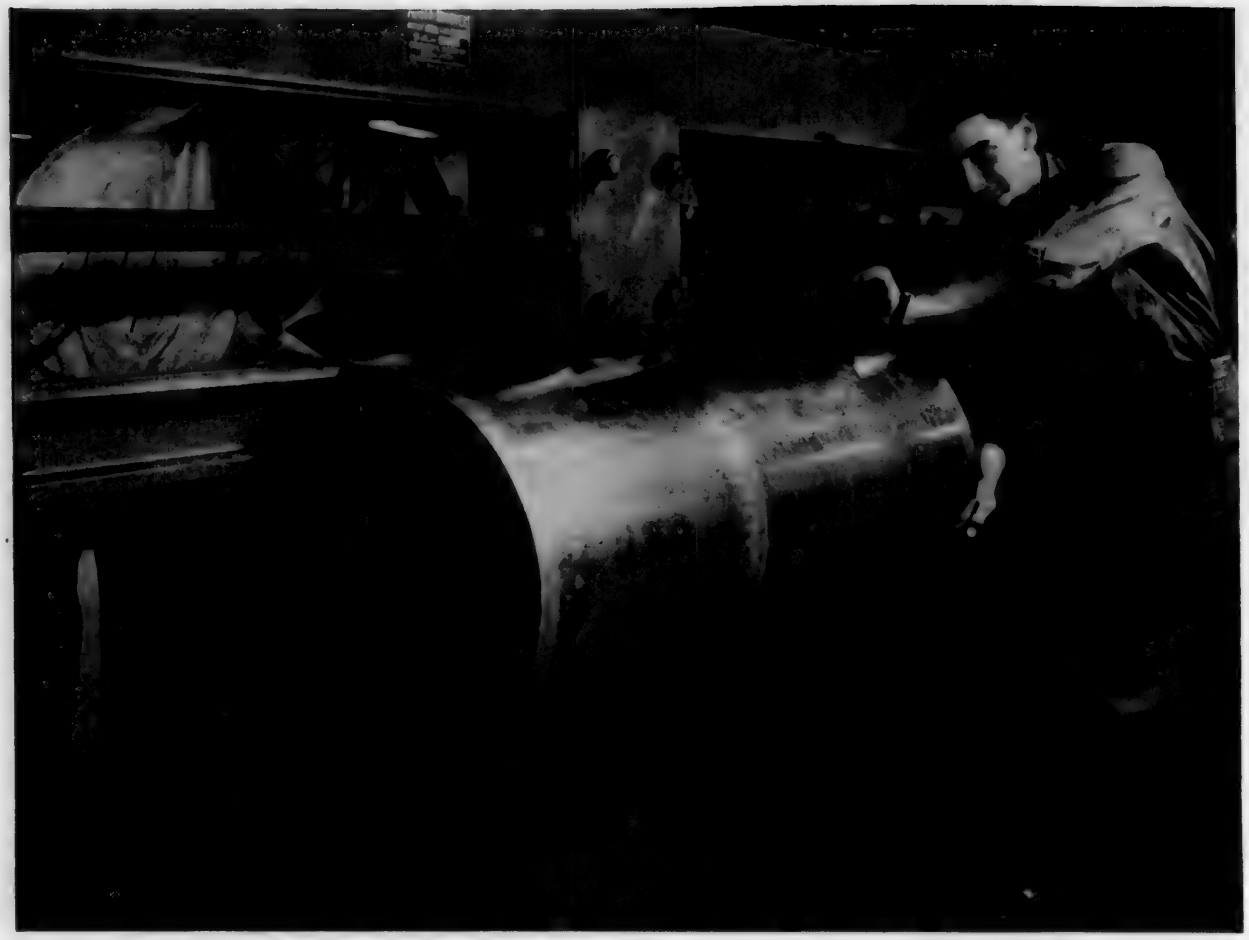
SARCOTHERM

An Affiliate of SARCO Co., Inc.

*

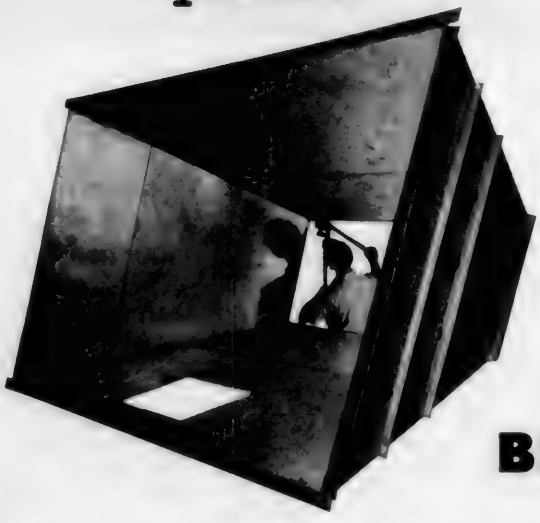
FOR COMPLETE CONTROL SYSTEM CATALOG
write Sarcotherm Controls, Inc.,
635 Madison Ave., New York 22, N. Y.

6176-B



Bethcon Galvanized Steel

forms easily, builds strong product



When you flex a piece of Bethcon galvanized sheet steel, you notice it has a certain extra "something." Liveliness, if you will. Toughness, perhaps. Or strength with ductility. Whatever you might call it, Bethcon is a sheet that forms up easily, builds a strong end product.

There's a sound metallurgical reason for Bethcon's unique qualities. Our continuous galvanizing lines include a special annealing cycle which gives the steel its very desirable combination of ductility and stiffness. In addition, the galvanizing process deposits the zinc on the sheet so tightly that even the toughest forming and bending will not crack the coating.

You can specify Bethcon in a wide variety of gages and widths, coiled or in cut lengths. The base metal can be either plain open hearth steel or copper-bearing (Beth-Cu-Loy). A Bethlehem representative will be glad to supply further information.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

From full speed to 50% reduction...

draft keeps pace with boiler needs

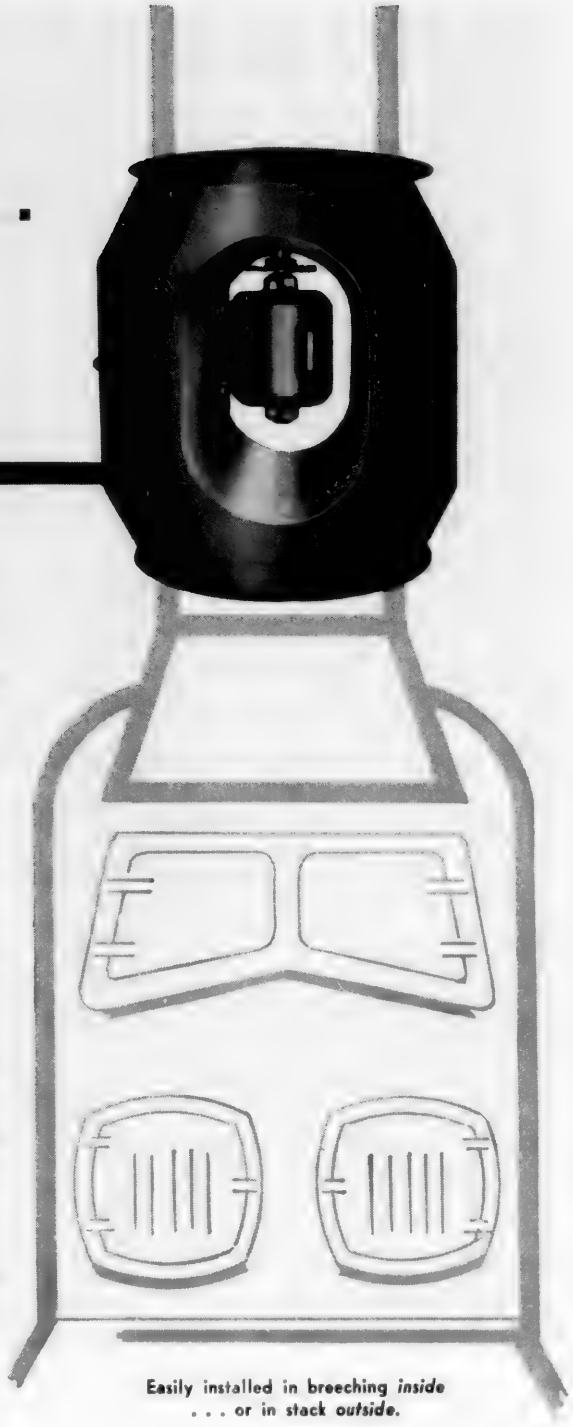
11-step controller for single-phase motors. 9-step model for 3-phase motors also available.

Located anywhere in the boiler room, motor speed controllers for DeBothezat Induced Draft Bifurcator® Fans permit *complete draft flexibility.*

As draft requirements vary during starting and fluctuating loads, fan speed can be adjusted for optimum boiler performance.

DEPENDABLE . . . COMPACT Direct motor drive eliminates belts. Motor is completely isolated from fumes and heat. This results in such dependable performance, these DeBothezat units are widely used in unattended radio-TV relay towers and pipeline stations.

DeBothezat Induced Draft Bifurcators are available for high pressure boilers delivering up to 60,000 pounds of steam per hour and low pressure boilers delivering up to 190,000 EDR.



Easily installed in breeching *inside* . . . or in stack *outside.*

FOR FURTHER INFORMATION
SEE OUR CATALOG IN
SWEET'S
PLANT ENGINEERING FILE
OR WRITE FOR COPY

De Bothezat™ FANS

A DIVISION OF

American Machine and Metals, Inc.

EAST MOLINE, ILLINOIS

IN CANADA: Represented by DOUGLAS ENGINEERING CO., LTD., Toronto • Montreal

Now we're cooling with **GAS**

A 22-foot wall of sheer glass... yet it's always cool inside! – thanks to GAS-operated Arkla-Servel air conditioning

The strikingly modern Hillside Church is one of four completely air-conditioned buildings in Rose Hills, Southern California's beautiful memorial park. Because of the liberal use of glass walls, and the desire for one central system, the air conditioning installation presented unique problems.

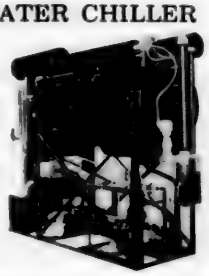
After a careful study, the Arkla-Servel gas absorptive cooling system was chosen. "And we're com-

pletely satisfied," says John D. Grigg, President. "Our 25-ton gas unit produces 10,000 cubic feet of cool air per minute. And you can't beat it for economy. It requires practically no maintenance. Since it uses the same boiler, it makes use of our heating facilities on a year-'round savings basis."

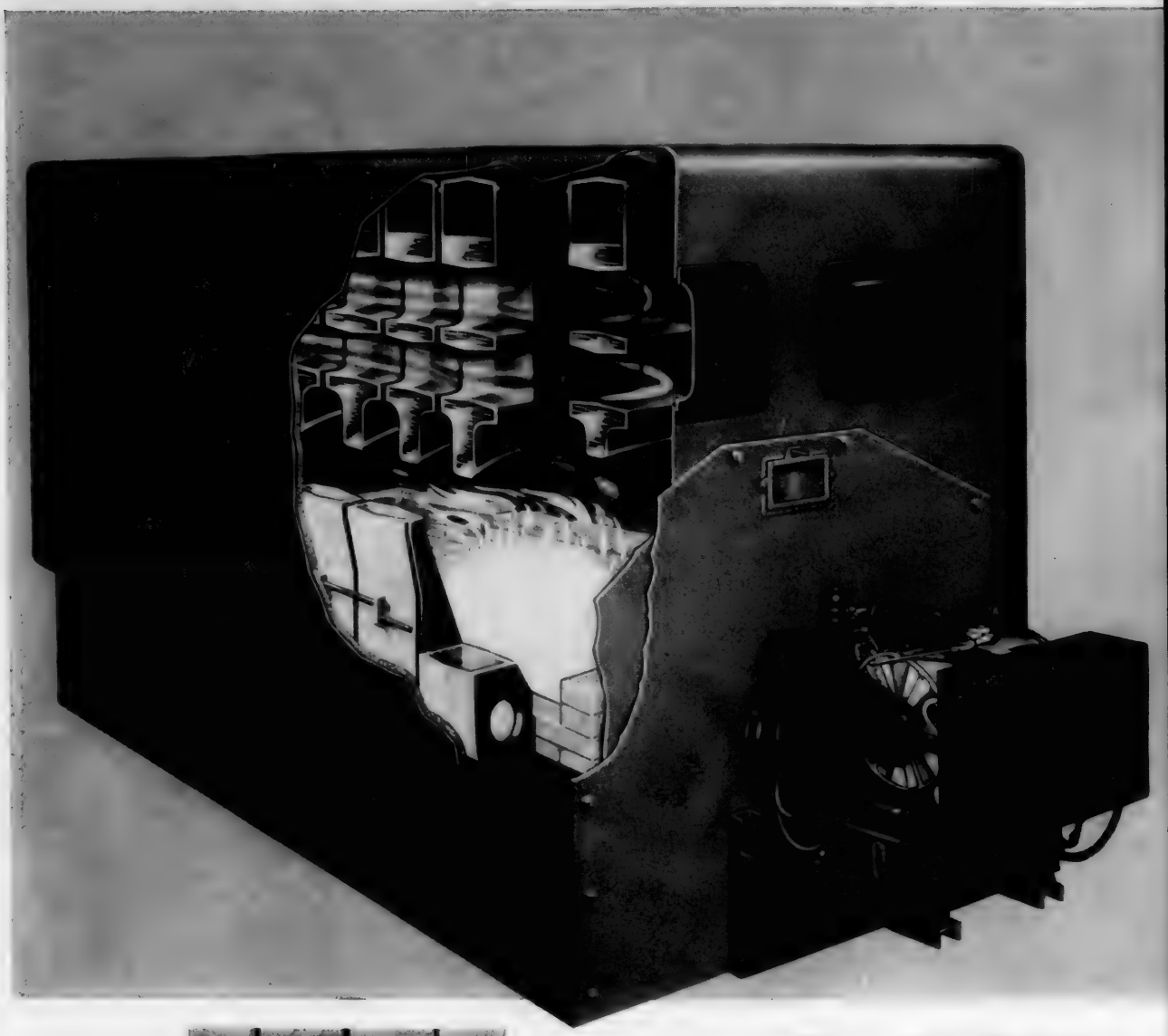
Gas absorptive cooling can put your heating plant on a year-'round economical basis too. For specific information, call your local gas company, or write to the Arkla Air Conditioning Corporation, General Sales Office, 812 Main Street, Little Rock, Ark. *American Gas Association.*

GAS OPERATED ARKLA-SERVEL
ABSORPTION-TYPE WATER CHILLER

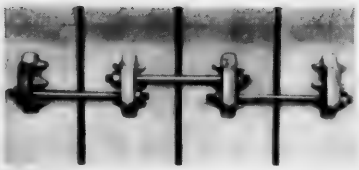
- lowest operating costs
- fully automatic operation
- long dependable service
- packaged construction
- compact size
- easy installation



THE FIRST CAST IRON FOR NO. 5 OIL OR



FEATURES FOR EASIER ERECTION



SHORT DRAW-RODS

Multiple short draw-rods are used to tie the sections together. This assembly equalizes the stress between sections—permits easier, faster erection.

Sections are *not* face-ground—the tough outer skin of cast iron is left intact to protect against corrosion. Spaces between sections are made gas-tight with asbestos cement.

Steam supply header

"EASY FIT" STEAM SUPPLY HEADERS

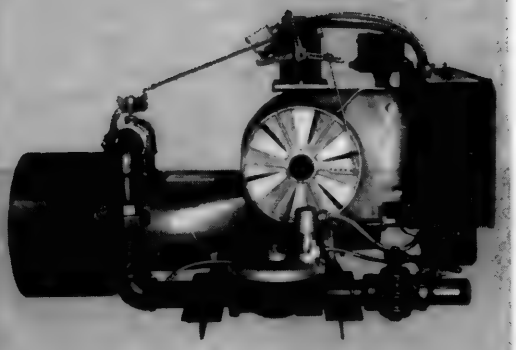
Flexible in all three directions! Permits normal expansion and contraction of the header parts without setting up stresses on any one part.

Cast Iron Return Headers are also available for both steam and water boilers.

Steam or hot water return header

BOILER-BURNER UNITS
COMBINATION GAS–LIGHT OIL

Heavy oil burner



Combination gas—light oil burner

in a capacity range of 3,395 to 12,260 sq. ft. of steam

These new Weil-McLain units offer all the operating economies which only modern *cast iron* boilers equipped with the latest design firing devices can provide. They are furnished with air atomizing, pressure type burners, completely integrated with the most up-to-date electronic controls and factory-engineered combustion chamber design.

The Oil Heating Units, while primarily designed to burn low-cost No. 5 oil, will efficiently handle all grades of lighter oils. The combination Gas—Light Oil Units can burn either gas or No. 2 fuel oil.

The efficient performance of Weil-McLain Boilers is a well established fact. When fired with these modern burners, an unusually high degree of economy is assured.

Heavy Oil Burners

These burners are capable of burning Nos. 1, 2, 4 or 5 oil and furnish all the air needed for combustion. The accurately metered, intimate mixture of air and heavy oil into a highly combustible spray or fog in the nozzle is the key to superior performance. Burners start with small flame which gradually and smoothly builds up to proper size. Electronically controlled for safe operation.

Combination Gas—Light Oil Burners

These units combine a power gas burner and a high pressure air atomizing burner. High efficiency is assured by correct metering of air and fuel. For both gas and oil operation, burner starts with small flame and builds up to required size. Electronically controlled, with pre-purge and post-purge...manually or automatically changed from one fuel to another.

For complete information, send for Bulletin C-272. For information on other Weil-McLain Gas and Oil Boilers, see Engineers' Product File or Sweet's Architectural File.

BURNER SERVICE PROVIDED FOR ONE YEAR, INCLUDING START-UP

WEIL-McLAIN

ICH AND ICL 40 AND 44 BOILER-BURNER UNITS

FOR COMMERCIAL AND INDUSTRIAL HEATING SYSTEMS

WEIL-McLAIN BOILERS and RADIATORS

WEIL-McLAIN COMPANY
MICHIGAN CITY, INDIANA

Address literature requests to Dept. BB-49

To serve you better we created a new division

Now you can benefit from the combined engineering backgrounds and product lines of three American-Standard* divisions—American Blower, Ross Heat Exchanger, and Kewanee Boiler—consolidated into *one* organization!

Here is *one-source* responsibility for quality and performance in equipment that is designed, engineered, and manufactured to work together. You draw from a product line unsurpassed in the industry . . . one that encompasses air conditioning, heating, ventilating, heat transfer, dust collection, and fluid drives.

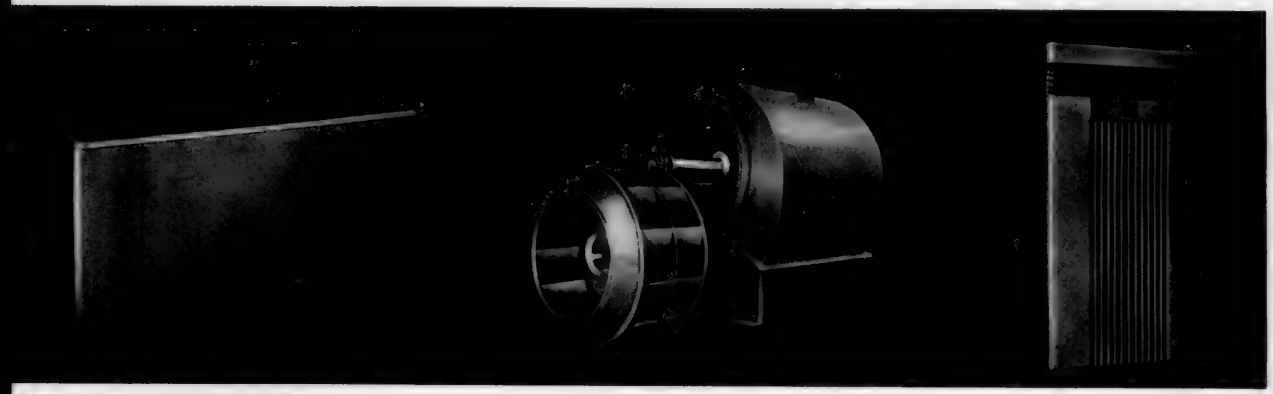
There are engineer-staffed offices in all principal cities to work with architects, consulting engineers, and contractors with equipment selection and on-the-job problems. Send for Bulletin B-5829 for facts about the new: American-Standard Industrial Division, Detroit 32, Michigan. In Canada: American-Standard Products (Canada) Limited, Toronto, Ontario.

Firebox, scotchtype steel boilers and package units for heat, power, steam.

Centrifugal refrigerating machines for central-station air-conditioning systems.

Central-station air-conditioning units for public buildings, industrial plants.

ONE CALL FOR ALL!



Fancoil units for cooling and heating individual rooms in multi-room structures.

Heavy-duty centrifugal fans for high pressure air conditioning or ventilating needs.

Packaged commercial air conditioners, air or water cooled types, 3 to 20 tons.

* AMERICAN-Standard and Standard ® are trademarks of American Radiator & Standard Sanitary Corporation.

AMERICAN-Standard
INDUSTRIAL DIVISION

AMERICAN BLOWER PRODUCTS • ROSS PRODUCTS • KEWANEE PRODUCTS

"You mean you get both air *and* light from the same unit?"

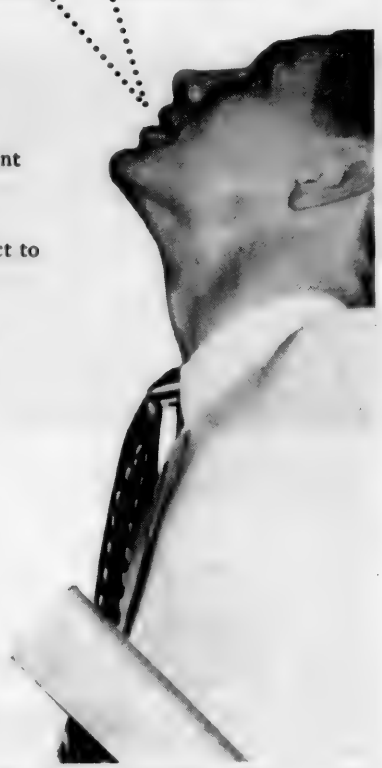
"That's right. It's the new **MULTI-VENT TROFFER** The air diffuser is completely concealed in the flush light fixture!"

There's more to the new **MULTI-VENT TROFFER** than meets the eye!

It combines a great advance in gently diffused, draft-free air conditioning, with modern, highly efficient lighting at a substantial savings in cost!

Complete concealment of the air diffuser within the handsome light fixture means freedom for the architect to design clean, uncluttered ceilings, greatly simplified mechanical planning for the engineer and . . . for the contractor . . . faster, easier field installation.

Write for detailed literature and the name of the representative in your area.



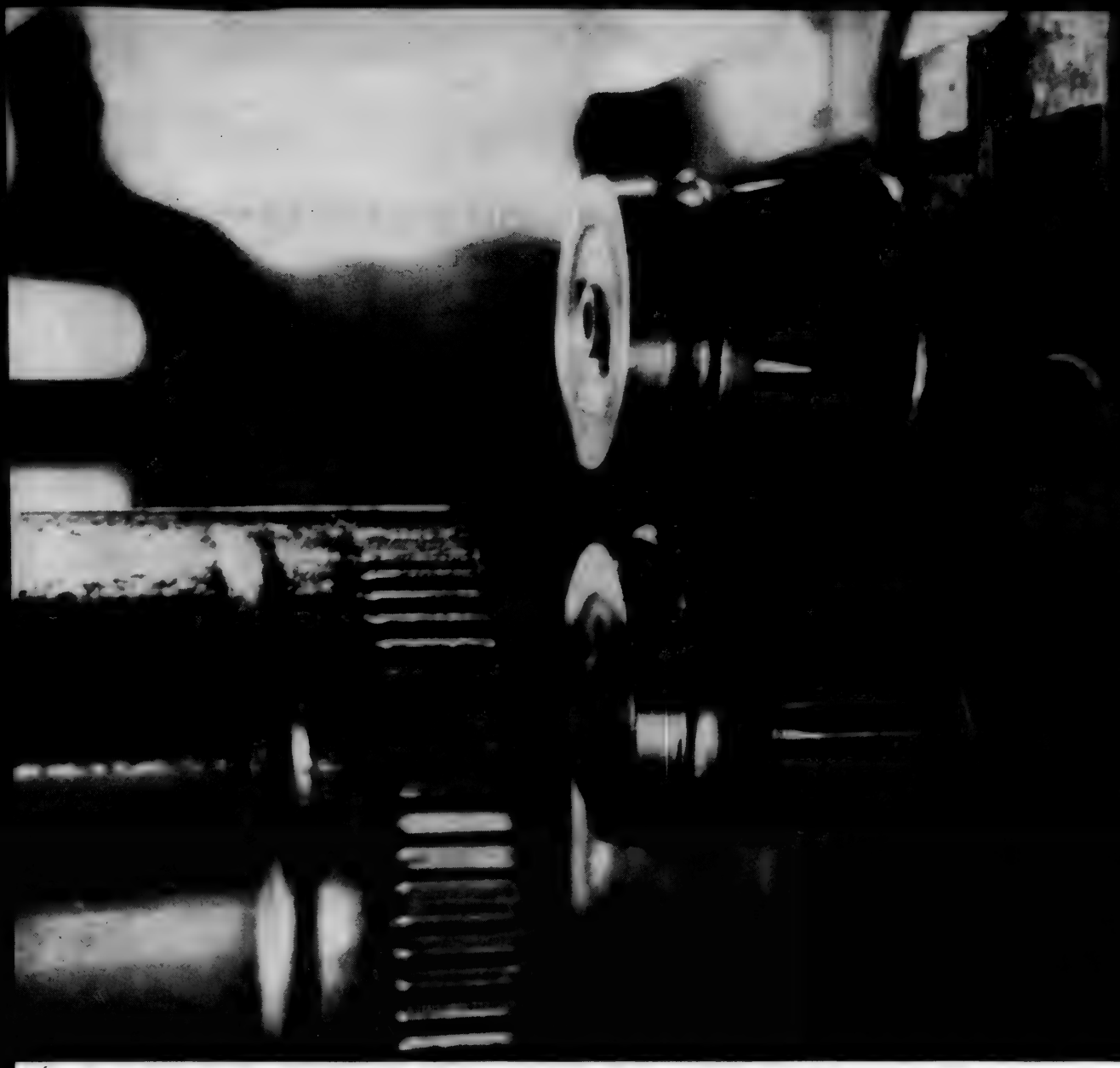
multi-vent

DIVISION OF
THE PYLE-NATIONAL COMPANY

1374 N. Kostner Avenue, Chicago 51, Illinois

WHERE QUALITY IS TRADITIONAL

SALES AND ENGINEERING REPRESENTATIVES IN PRINCIPAL CITIES OF THE UNITED STATES AND CANADA



"NO REJECTS IN OUR SHOP! WE CRIMP CHIP-PROOF WEIRKOTE®"

See for yourself, as so many others have. Put zinc-coated Weirkote through its paces. Give it the business—the toughest, most tortuous jobs in the shop. Crimp it, bead it, twist it, spin it, draw it. Work it to the limits of the steel itself. Then take a close look.

Not a chip or flake mars its smooth zinc surface! And why should they? Weirkote's continuous process integrates zinc and steel so tightly that chipping and flaking do not occur and a new high in corrosion protection is assured.

Can you imagine what this means to repeated, top-notch production results? To the goodwill of your customers who will continually get the best finished products on the market? To your peace of mind, rid, at last, of annoying, costly rejects?

In spite of all these advantages, Weirkote's cost is low. One more good reason why you should write today for a free 12-page booklet that explains in detail how Weirkote can help you. Weirton Steel Company, Dept. N-8, Weirton, West Virginia.

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

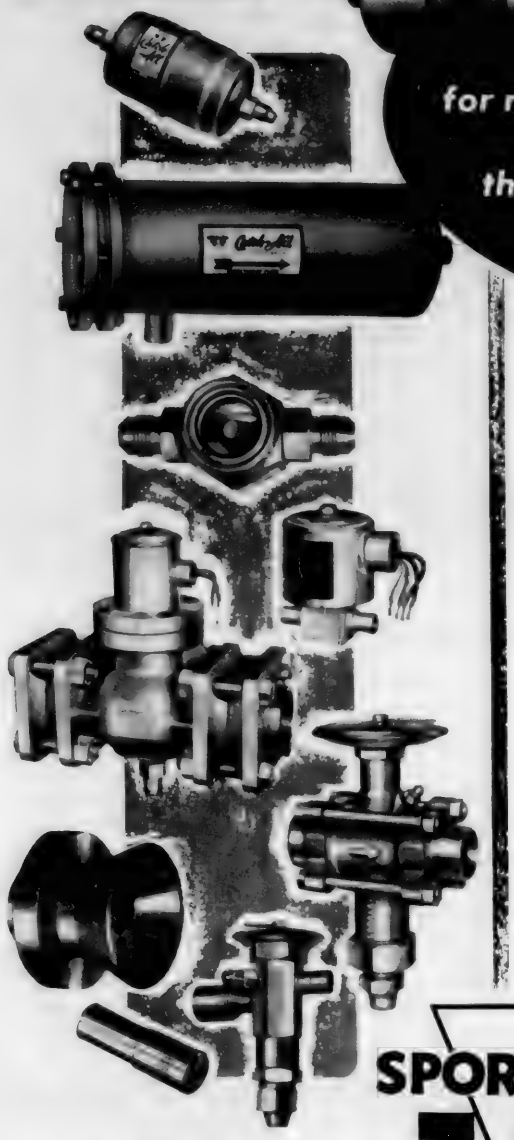
WEIRTON, WEST VIRGINIA

a division of

NATIONAL STEEL CORPORATION

Every Air Conditioning Installation *deserves* SPORLAN PEAK PERFORMANCE... *Right Down the Line*

for no matter how large or small the installation... there's a Sporlan combination engineered to fit it PERFECTLY!



Sporlan Catch-All filter-driers with the famous molded porous core, keep systems perfectly clean, perfectly dry and acid free!

Sporlan's amazing new See•All moisture & liquid indicator shows whether the refrigerant is wet or dry and if the system is fully charged.

The superior design of **Sporlan Solenoid Valves** with Blue Seal Coils gives high MOPD ratings, permitting them to be used on applications with either refrigerants 12 or 22.

The Flow-Master element, exclusive with Sporlan Thermostatic Expansion Valves for air conditioning, minimizes valve hunting and smooths out evaporator performance.

Sporlan Refrigerant Distributors with the versatile interchangeable nozzles, not only permit a wide range of coil applications, but give uniform distribution to any number of circuits regardless of load or evaporator temperatures.

So... whether your next air conditioning job is large or small, buy Sporlan throughout and get Peak Performance Right Down the Line!

See your Sporlan Wholesaler today.

SPORLAN VALVE COMPANY
7525 SUSSEX AVENUE
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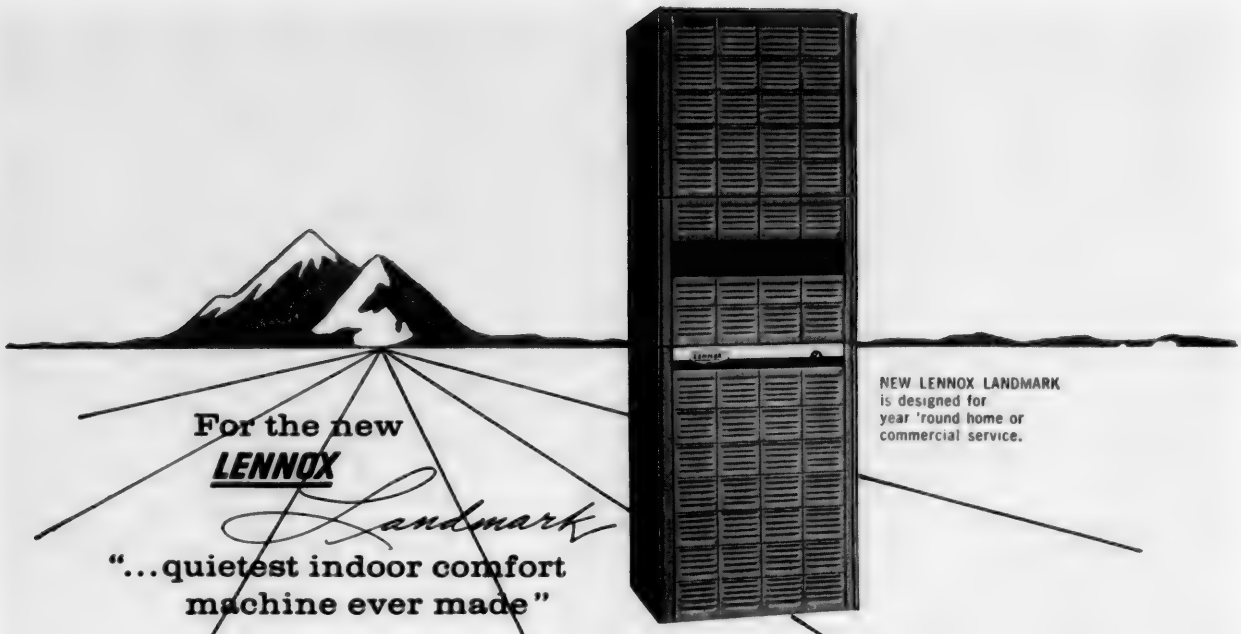
Our 25th Anniversary... 1934-1959



NEW LENNOX LANDMARK
is designed for
year 'round home or
commercial service.

For the new
LENNOX
Landmark
"...quietest indoor comfort
machine ever made"

FAFNIR Super-Quiet BALL BEARINGS

"...finest bearings obtainable for this service"

In the all-new Lennox Landmark, whisper-quiet service is as much a comfort feature as unique "made-to-measure" heating and cooling provided by interchangeable components — a Lennox innovation.

Uncompromising emphasis on noiseless operation in the development of the versatile Landmark is well borne out by specification of Fafnir Super-Quiet Ball Bearings for the blower shaft mountings.

Balls and races of these Fafnir bearings are specially finished for soundless service. Virtually wear-free bearing steel, lifetime factory lubrication, and positive Plya-Seal protection against dirt, moisture, and loss of lubricant assure quiet, maintenance-free bearing performance through all seasons, year after year.

Take advantage of the job-designed features Fafnir builds into bearings and bearing units for heating and cooling equipment. You'll find a complete selection of types and sizes. Write for new bulletin to The Fafnir Bearing Company. New Britain, Connecticut.

FAFNIR SUPER-QUIET BALL BEARINGS on the blower shaft assure silent, power-saving, maintenance-free bearing performance. They are permanently prelubricated and sealed. Specially-developed current-conducting rubber is used when bearings are supplied with grommets, or in rubber cartridges or pressed steel pillow blocks.

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

KRAMER **UNICON**

WAY OUT IN FRONT and deservedly so!

KRAMER's largest UNICON has *50% more* capacity than any other! ▶ New, all aluminum casing ends rust and corrosion. Stands and structural steel are galvanized after fabrication. ▶Time-tested WINTERSTATS prevent low receiver pressure and insure start-up under any weather condition.

Available with horizontal or vertical air flow. Lowest silhouette. ▶ Kramer's UNICON is so quiet it can be used in unlimited multiples. ▶ No one can match Kramer's 20 years of accumulated know-how in air-cooled condensing and no other air-cooled condenser can match the Kramer UNICON—the pioneering leader in the industry.

WRITE FOR BULLETIN

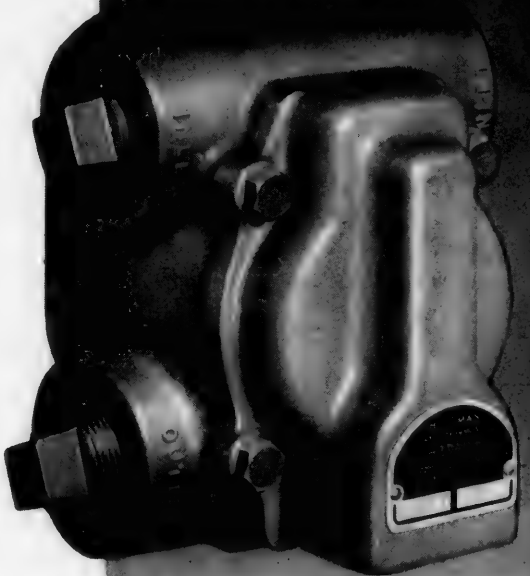
KRAMER TRENTON CO./Trenton 5, N. J.

46 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

H

Again Hoffman provides industry with an improved product, refined to function more effectively and economically in removing condensate. The new 50 Series Float and Thermostatic Trap has an integral thermostatic air by-pass consisting of thermal element, seat, and cage, factory set and sealed assuring dependable service and easy maintenance.

Hoffman engineers thus anticipate industrial steam heating trends that demand less maintenance and operating costs.



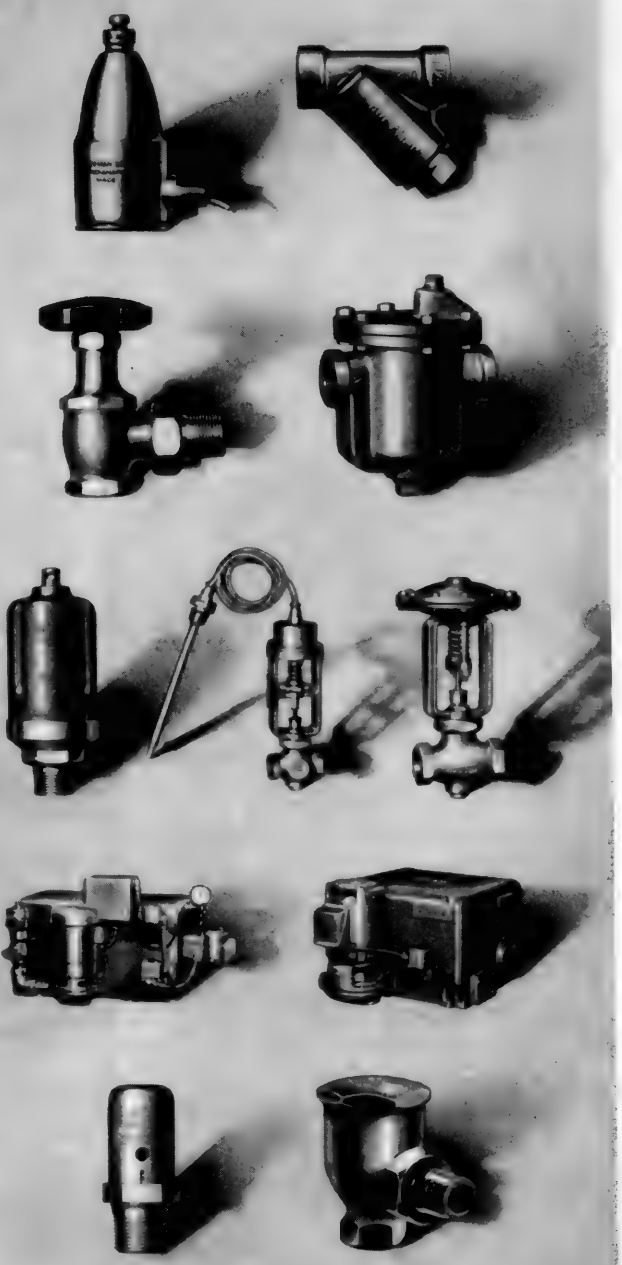
50 SERIES F & T TRAP

To release condensate and air and to prevent release of steam in steam systems. Extremely quiet in operation.

All working parts of the 50 Series Trap are mounted on the removable cover so that it is not necessary to break pipe connections for cleaning or repairing.

HOFFMAN

Complete line of
SPECIALTIES



SPECIALTY MFG. CORP.

1700 West 10th Street, Indianapolis 7, Indiana

VALVES, TRAPS, VACUUM AND CONDENSATION PUMPS, FORCED HOT WATER HEATING SYSTEMS, STOCKED AND SOLD BY LEADING WHOLESALERS OF HEATING AND PLUMBING EQUIPMENT.

This seal solves them all . . .

THIS UNIT HAS BEEN CERTIFIED AS COMPLYING WITH • ARI STANDARD 210 •
AIR-CONDITIONING
AIR-CONDITIONING
AIR-CONDITIONING

. . . *ALMOST*

The ARI Seal of Certification appearing on unitary air-conditioning equipment certifies that the unit's rated capacity is in accordance with ARI Standards.* This means that all units bearing the seal can be compared on a standardized basis. It means that you can now specify with assurance. It means that you can quote capacity ratings to a customer, knowing the facts are backed up by:

1—the reputation of the industry's trade associations,

2—the results of an independent testing laboratory, and

3—the good name of the manufacturer whose product you offer.

but . . .

As a dealer-contractor, it's still up to *you* to make the necessary measurements, computations and calculations.

You still have to come up with the proper specifications.

The Seal of Certification doesn't solve these problems for you.

It *does* solve the problem of determining which units meet your specifications.

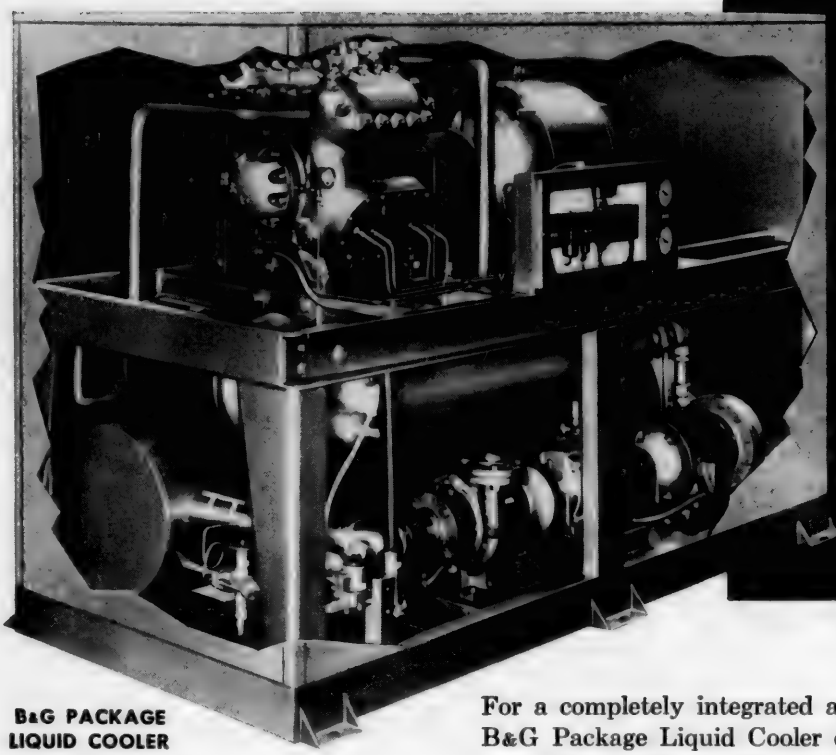
And, since these units will do the job your specifications call for, you're spared the additional problems of complaints, service calls, dissatisfied customers, and mounting expenses for repairs or replacement of equipment.

*"Unitary" air-conditioners: Packaged air-conditioners, whether single units or combined units (called "split" systems), but not including room air-conditioners or heat pumps. ARI Standard 210-58 for electrically-driven equipment; ARI Standard 250-58 for heat-powered equipment.

The following manufacturers are participating in the program: Airtemp Division, Chrysler Corporation • Amana Refrigeration, Incorporated • American Blower Division of American Radiator and Standard Sanitary Corporation (American-Standard Industrial Division) • American Furnace Company • Arkla Air Conditioning Corporation • Armstrong Furnace Company, Division of National Union Electric Corporation • Bryant Manufacturing Company, Division of Carrier Corporation • Carrier Corporation • Columbia Specialty Company, Incorporated • Coolerator Division, McGraw-Edison Company • Curtis Manufacturing Company • Day and Night Division, Carrier Corporation • Fraser and Johnston Company • Friedrich Refrigerators, Inc. • Frigidaire Division, General Motors Corporation • Gaffers & Sattler, Division of Utility Appliance Corporation • General Electric Company • Gibson Refrigerator Company, Division of Hupp Corporation • Grove Furnace, Inc. • Hall-Neal Furnace Company • International Heater Company • Janitrol Heating and Air Conditioning Division, Surface Combustion Corporation • Lennox Industries, Inc. • The Majestic Company, Inc. • The Mathes Company, Division of the Glen Alden Corporation • Mueller Climatrol, Division of Worthington Corporation • National-U. S. Radiator Corporation • The Payne Company, Division of Carrier Corporation • Peerless Corporation • Perfection Industries, Division of Hupp Corporation • Rheem Manufacturing Company • Round Oak Company of Indiana, Incorporated • A. O. Smith Corporation • Southwest Manufacturing Company • Therm-Air Manufacturing Company • The Trane Company • Typhoon Air Conditioning Company, Division of Hupp Corporation • United States Air Conditioning Corporation • Westinghouse Electric Corporation • Worthington Corporation • York Division, Borg-Warner Corporation

Look for this seal . . .
the seal that helps you sell

For free explanatory booklet and Directory of Manufacturers participating in the Seal of Certification program, write to: Chief Engineer, Dept. B-4 Air-Conditioning and Refrigeration Institute, 1346 Connecticut Ave., N. W., Washington, D. C.

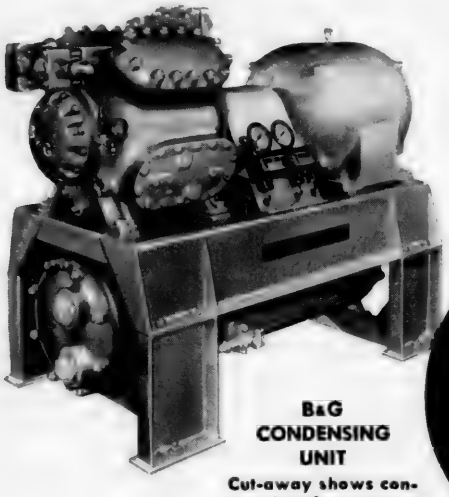


A WELL DESIGNED, COMPACT MACHINE WITH ALL MAJOR COMPONENTS COVERED BY ONE MANUFACTURER'S GUARANTEE!

B&G PACKAGE LIQUID COOLER

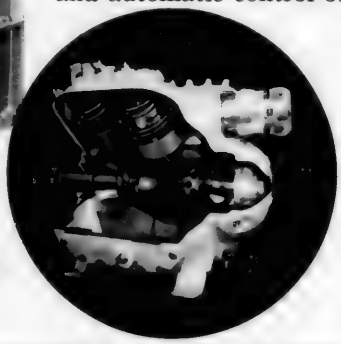
For a completely integrated and assembled water chiller, the B&G Package Liquid Cooler offers many outstanding advantages. It is equipped with B&G products throughout—the only unit of its kind *with all major components designed, built and guaranteed by one manufacturer!* This packaged unit eliminates many costs which might otherwise be charged against the job.

In capacities from 7½ through 150 tons, the matched components of the B&G Package Liquid Cooler give a complete capacity-engineered combination of chassis, motor, compressor and automatic control obtainable nowhere else. Everything included—no extras to buy.



B&G CONDENSING UNIT

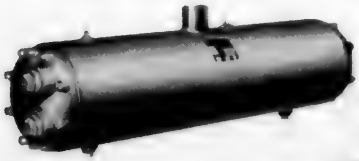
Cut-away shows construction of compressor



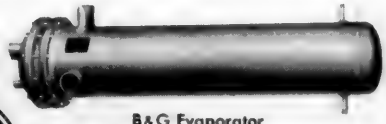
B&G CONDENSING UNIT

Here is another matched unit with all components manufactured and guaranteed by Bell & Gossett. It offers an impressive list of features, *many of them exclusive,* which make it completely outstanding. Amazingly compact as well as efficient—7½ through 150 tons.

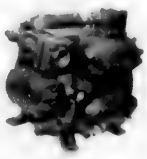
A FULL LINE OF REFRIGERATION AND AIR CONDITIONING COMPONENTS



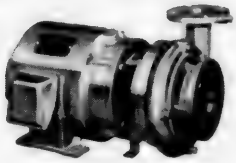
B&G Condenser



B&G Evaporator



B&G Motor Compressor



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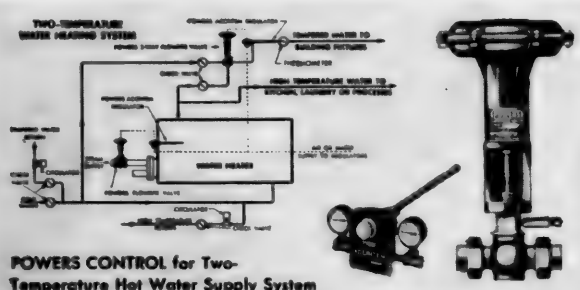
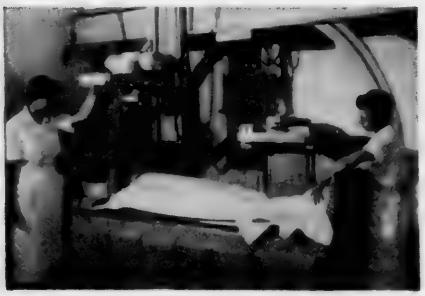
In Colorado's largest private general hospital

For more than 75 years the Sisters of Charity have been caring for the sick in Pueblo's St. Mary Hospital. Now its new imposing structure the St. Mary-Corwin Hospital contains modern facilities unsurpassed for diagnosis and treatment of disease, patient care and comfort. Powers Temperature Control here helps increase hospital efficiency.

Above: Recovery room for efficient post operative care



POWERS CONTROL for Two-Temperature Hot Water Supply System here prevents wasted fuel and danger of overheated water.



THERMAL COMFORT throughout is provided by POWERS Temperature Control for each individual room and various types of baths

Proper Thermal Environment is important in this 450 bed hospital. Patients, nurses, doctors and staff benefit from Powers air conditioning control in the surgical suite consisting of 8 major and 3 minor operating rooms, recovery and delivery rooms, X-Ray department, laboratory, maternity department and pediatric unit. Temperature in other spaces is also regulated by Powers individual room control system.

Greater Simplicity and year after year dependability of a Powers Pneumatic Control-System provides these money saving benefits —

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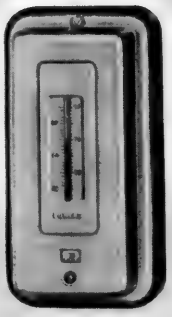
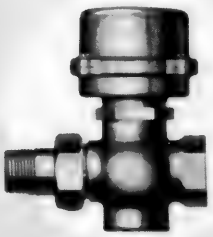
Powers Complete Responsibility — for a correctly engineered control system, proper installation, continuous successful operation and prompt SERVICE, when required, from offices in 85 cities.



732 Powers Pneumatic Thermostats maintain set temperatures constantly. They need no daily checking or readjusting. Patients, nurses, doctors, staff and visitors all benefit from the THERMAL COMFORT they provide throughout the hospital.

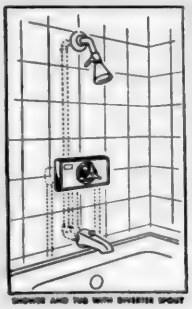
NO MORE Valve Packing Maintenance or Water Leakage with Powers PACKLESS Valves.



864 Powers PACKLESS Control Valves are used here on convectors, and unit ventilators. They're labor savers, and cut the cost of maintenance.

For Sitz Baths, Shampoo Tables, Arm and Leg Baths, etc.

PATIENT'S SAFETY and COMFORT in Hydrotherapy, showers, and infant baths are assured by Powers HYDROGUARD thermostatic water mixers. They are also used for X-Ray film developing, surgeon's wash-up sinks, artificial kidneys, blood coolers in heart surgery and many other applications.



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Dept. U, Skokie, Ill.
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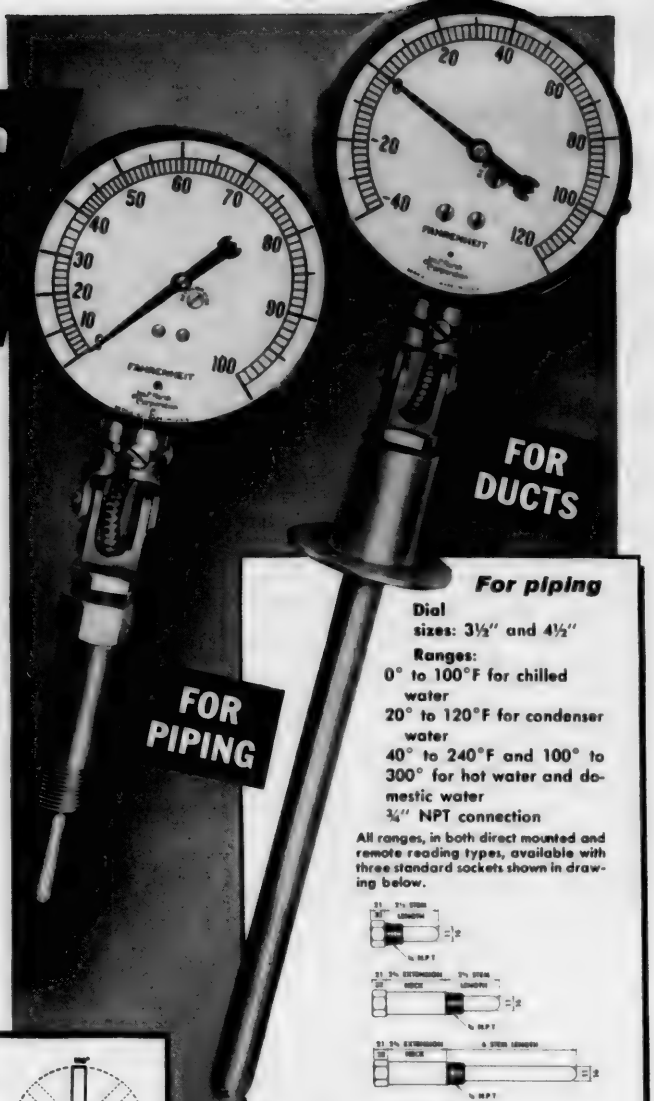


For piping

Dial sizes: 3½" and 4½"

Ranges:
0° to 100°F for chilled water
20° to 120°F for condenser water
40° to 240°F and 100° to 300° for hot water and domestic water
¾" NPT connection

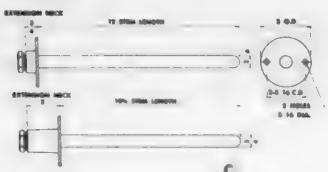
All ranges, in both direct mounted and remote reading types, available with three standard sockets shown in drawing below.

For ducts

Dial sizes: 3½" and 4½"

Ranges: —40° to +120° F
0° to 160° F
0° to 220° F

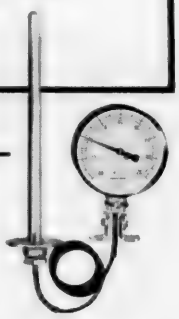
All ranges, in both direct mounted and remote reading types, available with standard extension necks and stems shown in drawing below.



MARSH
DIAL THERMOMETERS

Also remote reading—

Piping and duct thermometers of same basic design available with 6 ft. of capillary tubing as shown.



They compared "K" factors and cost factors . . . and bought ULTRALITE® Duct Insulation

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Carrier announces new Fan-coil Room Weathermakers

for commercial, industrial and residential buildings

These new Carrier 36T Fan-coil Room Weathermakers* have been added to a line that was already the finest in the air conditioning field. Designed to work with a boiler-chiller source of heating and cooling, they operate independently to provide the exact indoor weather desired for each room year around—regardless of requirements in other rooms or outdoor climate.

Engineered for use both in new and old buildings, these new Carrier units may be readily adapted to a wide variety of installation conditions. Available in three styles for free standing or recessed applications. Each style in four basic sizes—200 cfm, 300 cfm, 400 cfm and 560 cfm. Left or right hand piping arrangements, with electrical connections always provided at the opposite end.

A new, illustrated 16-page catalog, 36T-73, gives capacity tables, cooling curves, heating curves and other essential data about these new Fan-coil Room Weathermakers. For your copy, call your nearest Carrier dealer. He's listed in the Yellow Pages of your Classified Telephone Directory. Remember, you can air condition any building the best way with Carrier. Carrier Corporation, Syracuse, New York.

* Reg. U. S. Pat. Off.

MORE PROOF OF
BETTER AIR CONDITIONING FOR EVERYBODY EVERYWHERE
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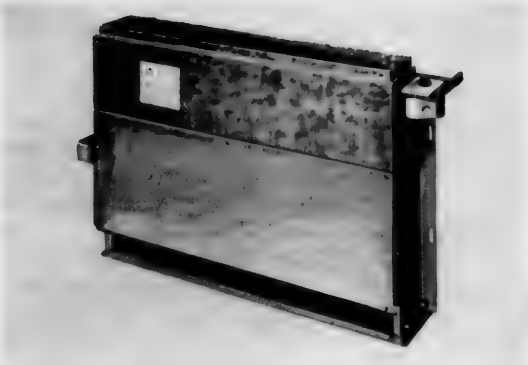
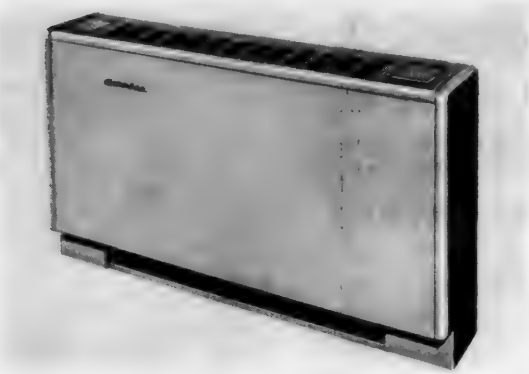


36T-204: Designed for flexible built-in applications, this style comes with the same variety of air damper options as cabinet style units. Can be supplied complete with standard control package options. Another model, 36T-304, is engineered for recirculating air operation only.

36T-104: Slim, attractive free-standing Weathermakers fit any room setting. Available for completely recirculating, 25% or 100% outside air operation, they feature a top discharge grille as standard equipment. An optional cabinet with front discharge grille may also be ordered.



You get these benefits when you install YARWAY GUN-PAKT EXPANSION JOINTS

Why do industrial plants, institutions, universities and central heating plants SPECIFY and INSTALL Yarway Gun-Pakt Expansion Joints?

Because with Yarway you get:

- **CONTINUOUS SERVICE**
  Costly shutdowns are eliminated. Packing is seldom necessary but may be added *under full line pressure.* No vents are necessary. Never needs repacking.
- **RUGGED DEPENDABILITY ALL STEEL CONSTRUCTION**
  Durable chromium plated seamless steel sleeves. No chance *of metal fatigue.* Wrought steel bases provide rugged, positive anchorage.
- **INTERNAL AND EXTERNAL GUIDES**
  Positive alignment of sleeve in stuffing box *—where it counts!*
- **LIGHT WEIGHT, STREAMLINED DESIGN**
  Requires less space to install—less space to maintain—smaller manholes.

Many Gun-Pakt joints have been *in service over 25 years with only nominal maintenance*—no major repairs or periodic overhauls. Maintenance costs are negligible—records show average to be one manhour and 65 cents worth of packing per joint per year. AND—NEVER A SHUTDOWN FOR REPACKING!

YARWAY field engineers are qualified to advise on installation and service—at no cost to you. Investigate today. Write for Bulletin EJ 1917 ('59).

FOR YOUR NEXT PIPELINE JOB—BE SAFE—BE SURE! SPECIFY YARWAY GUN-PAKT.

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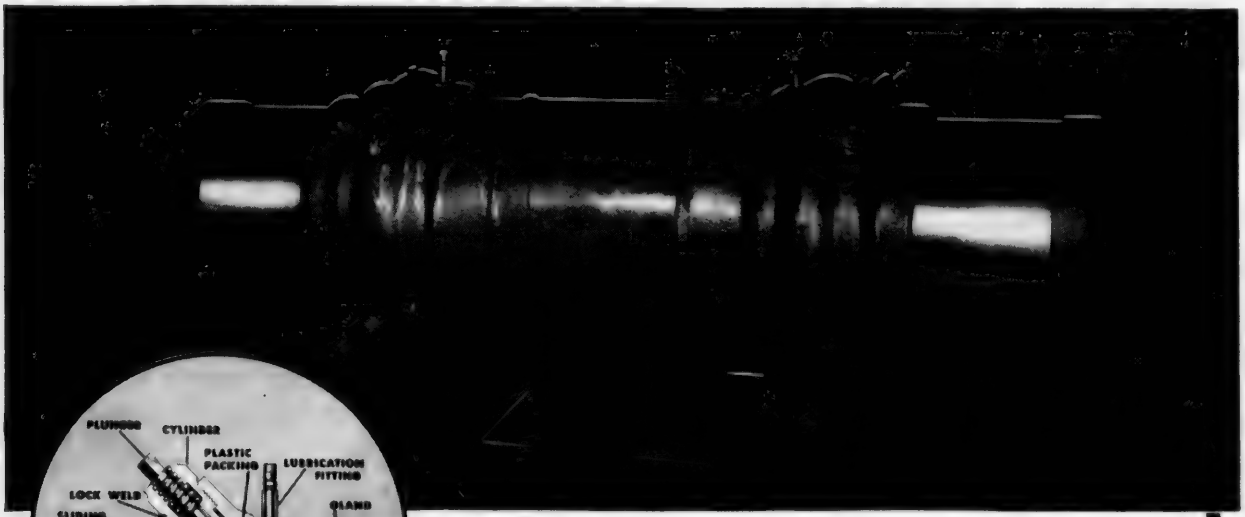

Cross-section of Gun-Pakt feature. To add packing, just insert a plug and turn the plunger. Note non-return packing slots.

YARWAY GUN-PAKT

New Book Answers Need for Training Text and Reference on Residential Cooling Systems

FOR:

CONTRACTORS
SALES ENGINEERS
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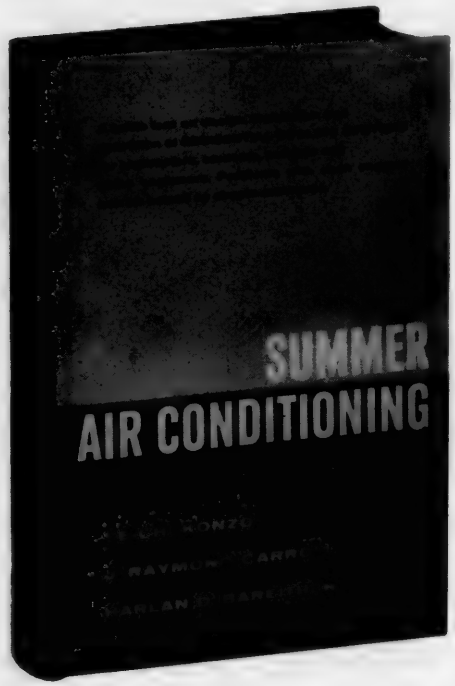

Summer Air Conditioning is a basic what-how-and-why book on *residential air conditioning* written to provide a much-needed training text and reference book for all who design, sell, install or operate air conditioning systems and equipment for houses and small buildings. Prepared at the request of the U.S. Armed Forces Institute, it contains problems and exercises for each chapter which help check the reader's understanding of the material. No problem calls for more than a common knowledge of arithmetic. For certain operations, the book shows how to use pre-calculated tables which make even simple multiplication unnecessary.

- All industry methods, including those recommended by engineering and trade associations, are taken into account in presenting selected procedures.
- Simple diagrams show essentials of mechanisms and principles of operation.
- Technical detail — included only when necessary — is broken down into simple components that can be understood even by a newcomer in the field.
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Right now, in the growing air conditioning field, it is important to train competent people rapidly to do the job of selling and installing equipment and systems. SUMMER AIR CONDITIONING explains simply and clearly how and why things are done and what makes equipment operate the way it does.

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A companion volume by the same authors, this book presents the why and how of controlled distribution of heat and humidity in small buildings and homes. It is designed to give dealers, contractors, installers and salesmen the full background they need to be sure each furnace or boiler, ducting or piping system is tailored to the needs of individual buildings. 640 Pages, 300 Illustrations, Fully Indexed, $8.00.
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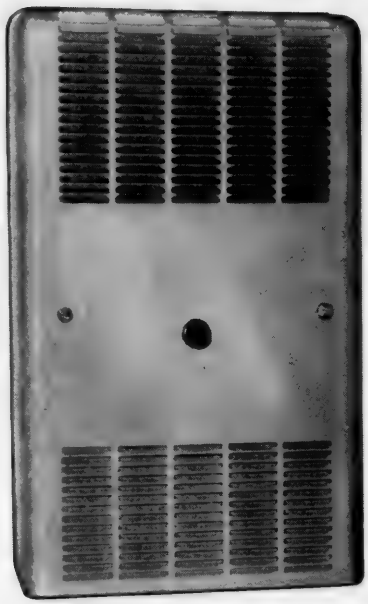

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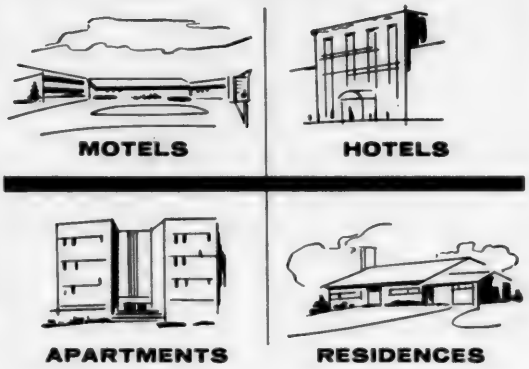

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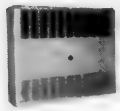

'CHC'

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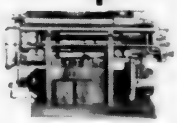
+



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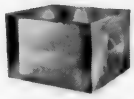

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The new "CHC" Cooling-Heating Conditioner continues the Dunham-Bush pattern of product progress providing "one-source-one responsibility" for all your air conditioning, heating, refrigeration and heat transfer needs.

"CHC" is a compact fan coil unit for mounting between-the-studs of a wall structure, designed to meet the smaller space and capacity requirements of motels, hotels, apartments and residences. Together with Heat-X Package Water Chillers, Dunham-Bush Pumps, and Water Savers, all the necessary equipment to meet complete specifications are provided.

Dunham-Bush "CHC" units are available in two basic sizes—Model CHC-150 and CHC-300. The standard unit is basically designed for free standing use readily adaptable for semi-recessed applications. Each standard unit can be wall mounted, fully exposed or semi-recessed, as required for "off the floor" installations. Matching trim pieces are available for finishing purposes on semi-recessed applications.

Other available features include fresh air wall boxes to meet ventilation requirements calling for the introduction of fresh air up to 20% of the rated CFM: rear discharge sections and grilles to permit discharge of up to 50% of the rated CFM to adjacent rooms where the standard unit is installed on a common interior partition.

Keep up-to-date on the latest! Write for complete "CHC" specifications or call your Dunham-Bush sales engineer.

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THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS

It's the Nash CSM

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These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

NASH ENGINEERING COMPANY
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Design Procedure for Slip-Type Expansion Joints

KENNETH S. ROBERTS
Mechanical Engineer, Yarnall-Waring Company
Philadelphia, Pa.

The slip-joint is widely utilized in modern steam as well as hot water lines for absorbing expansion and contraction. The author reviews installation design procedure, with special attention to anchor sizing and location, and pipe supports, concluding with the calculations involved in a typical system.

A WELL designed slip-type expansion joint is a rugged, dependable and economical means of absorbing expansion and contraction in pipe lines. It is particularly useful in steam and hot water transmission lines where the expansions and contractions are frequent and of large magnitude. Slip joints (see Fig. 1) contain no highly-stressed flexing element subject to failure after a finite number of cycles.

Slip joints require nominal maintenance in the form of packing and lubrication. The amount of maintenance depends largely on the operating conditions, but it seldom exceeds addition of packing once or twice a year and lubrication two or three times a year. The gun-packed type permits injection of packing into the stuffing box at any time with full temperature and pressure in the pipe line with no shut-down and minimum maintenance time.

Slip joints are used in indoor, outdoor, tunnel, and overhead trestle installation. Headpiece photo shows gun-packed joints in a tunnel at a large state institution in the Midwest. This is typical of the sort of installation in which slip joints are most advantageous—long steam distribution lines in which traverses are relatively large.

Overhead installations involve some special consideration in the handling of anchor loads. Figure 2 shows such an installation at a large Southern hospital. Pressure and friction loads are absorbed by the longitudinal trestle members. In this way, supporting columns and footings are subjected to vertical loads only, and their design may thus be relatively economical.

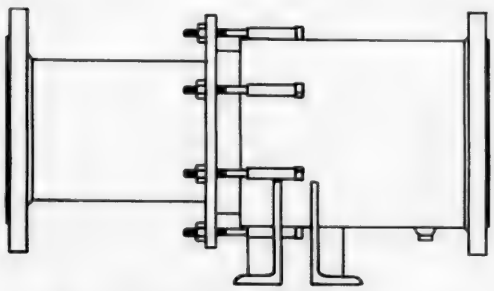


Fig. 1. (above) Conventional slip-type expansion joint.

INSTALLATION DESIGN

Simplicity of piping design is one of the advantages of using slip-type joints. Pressure and temperature ratings will be determined by the operating conditions. Joints are available with flanged or welding ends, the choice depending upon such factors as the permanence of the installation, the possibility of leakage in flanged joints, and field welding problems.

Fig. 2. (right) Gun-packed, slip-type expansion joints are used in this elevated system at a large hospital.

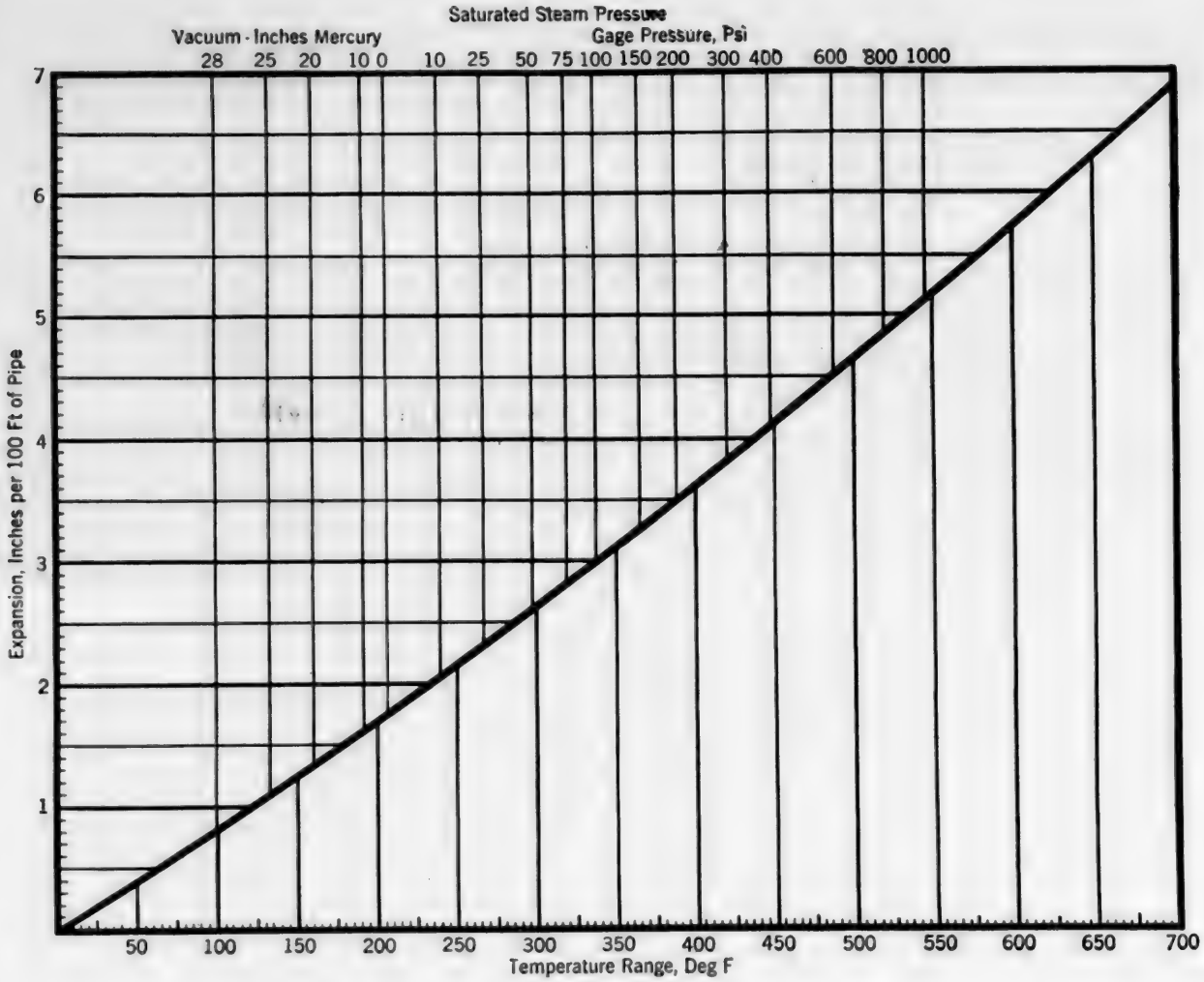

Saturated Steam Pressure
Vacuum - Inches Mercury
Gage Pressure, Psi
28 25 20 10 0 10 25 50 75 100 150 200 300 400 600 800 1000
Expansion, Inches per 100 Ft of Pipe
1 2 3 4 5 6 7
50 100 150 200 250 300 350 400 450 500 550 600 650 700
Temperature Range, Deg F

Fig. 3. Curve for calculating expansion of steel pipe spans.

Determine the Traverse

For a given joint, the traverse required is determined by the length of span, the pipe material—usually carbon or alloy steel—and temperature range. Temperature range should provide for extreme lows as well as extreme highs, particularly in outdoor installations where a winter shut-down might result in considerable contraction of the pipe. If not provided for, contraction can be just as damaging as expansion.

Figure 3 gives the expansion of steel pipe for any temperature range up to 700 deg F, and, for convenience, also provides saturation temperatures for various steam pressures. Chart values include a safety factor of 10% over actual pipe expansion to provide for discrepancies in installation and unforeseen temperature extremes.

Locate Anchors

In all piping systems anchors are required to stabilize the piping at certain points, such as at pipe junctions and terminal points. Also, anchors are necessary to insure that each expansion joint functions as intended. When more than one expansion joint are required in a particular span, additional anchors must be installed to divide the span into sections so that each expansion joint absorbs only the expansion in its own section. For this reason, double-ended joints must always be anchored and are thus furnished with built-in bases. Conversely, two anchors must not be placed in a straight span without an expansion joint or some other device to absorb the expansion between them.

Anchorage problems can often be simplified by using expansion joints with built-in anchor bases since this eliminates the need for a separate pipe anchor. As shown in Fig. 4, these bases are usually furnished with holes for bolting, although in this view the bases are welded to structural steel anchors. The head piece photo shows several unanchored single-end joints which are "floating" in the span. In this case the spans are anchored at each end by some means independent of the expansion joints.

Determine Anchor Loads

In designing anchors it is important to determine carefully the loads they must carry, particularly with high pressures and large pipe sizes, because of the high thrusts that develop at end anchors. End anchors are those occurring at terminal points and changes in direction of pipe. At such points the internal pressure would, if unrestrained by anchors, tend to pull an expansion joint apart. Thus, end anchors must absorb this pressure

reaction as well as the forces required to activate the expansion joint and to overcome friction in pipe supports and guides. Intermediate anchors are subject to only the latter force.

The curves in Fig. 5 illustrate the relative magnitude of end and intermediate anchor loads for slip-type expansion joints and provide reasonably accurate anchor load values for different pipe sizes and pressures.

Offsets in piping can be a source of trouble. An offset creates a bending moment on the pipe and elbows which is proportional to the thrusts at the elbows and to the length of the offset. If the expansion in the offset leg is small, an additional expansion joint may not be necessary, and diagonal bracing of the elbows will probably suffice to prevent excessive bending stresses in the pipe. However, in some cases it will be necessary to anchor both elbows and install an expansion joint between them.

The importance of analyzing and properly providing for anchor loads is graphically illustrated in the following actual case. A large steam line in a tunnel had a right angle offset of several feet. One elbow was connected to the body of a slip-type expansion joint which was very solidly anchored. The other elbow was lightly braced by an I-beam that was not properly aligned with the run of the pipe. This brace was not strong enough and it eventually collapsed. The full end anchor load then acted on the offset and created a large moment at the other elbow and the adjacent expansion joint.

Although the joint anchorage was more than adequate for its normal loading, it could not support this additional stress. The anchor bolts were all sheared or dislodged from their concrete foundations, and, but for its limit stops, the expansion joint probably would have separated. Because of its rugged construction, it withstood the abnormally high stresses impressed upon it and prevented further damage to the system. This case demonstrates the potential force of a moment, and, even more important, it shows how serious the effects of a failure in one part of the system can be to other parts of the system.

Fig. 4. Tunnel installation. Note anchors.

Pipe Alignment Must Be Good

Slip-type expansion joint installations require good pipe alignment to perform satisfactorily. Guides serve two important purposes. First, when properly installed near an expansion joint, they prevent the excessive friction and wear which can result from misalignment of the pipe. Second, they prevent buckling of long spans of pipe when they are subjected to compressive loads as they expand. The tendency to buckle increases as the pipe becomes smaller in diameter, longer, or both; hence, the need for guides is greatest with long spans of relatively small pipe. Table 1 gives recommended spacing of guides from expansion joints and also between guides for various pipe sizes.

Pipe Supports to Withstand Thrust

Table I also provides generally recommended spacing of supports for steel pipe filled with water. The importance of adequate support is well recognized. However, it should be pointed out that supports must be designed to withstand the thrust resulting from motion of the pipe over the supports as well as the vertical load due to gravity. Failure to provide for this thrust has resulted in failure of the supports in some installations.

INSTALLATION

Having designed the system and selected the expansion joints, it is advisable to observe the following points at the time of installation. Align the expansion joint carefully with the pipe span so that motion of the sleeve (or bellows) is axial and lateral thrusts on the joint are minimized. Also, and for the same purpose, be sure

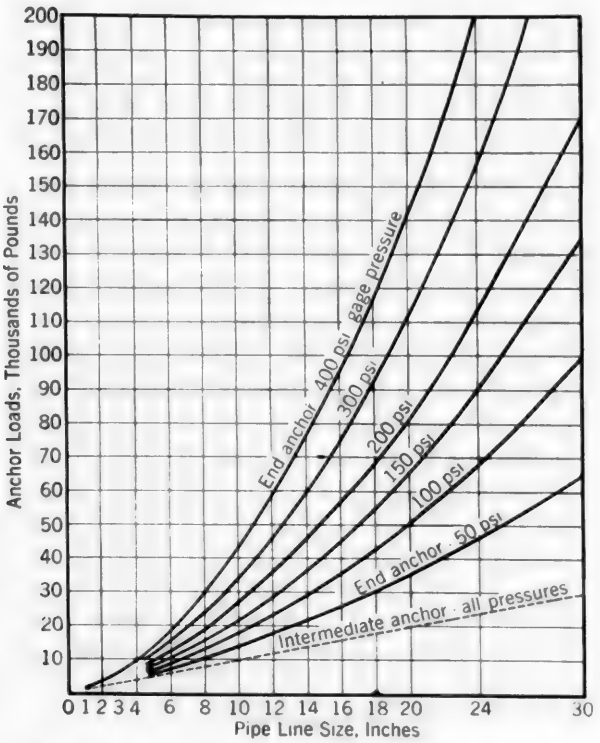


Fig. 5. Slip joint anchor loads can be read directly from these curves.

TABLE I—RECOMMENDED SPACING FOR GUIDES AND SUPPORTS (FEET)

Nominal pipe sizes (inches)	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Distance between alignment guide and exp. joint	8	10	11	12	13	14	15	16	18	20	21	22	23	24	25	26
Distance between alignment guides	10	13	15	19	22	25	30	35	45	60	70	80	90	100	105	110
Maximum distance between pipe supports	8	10	11	12	13	14	15	16	18	20	21	22	23	24	25	26

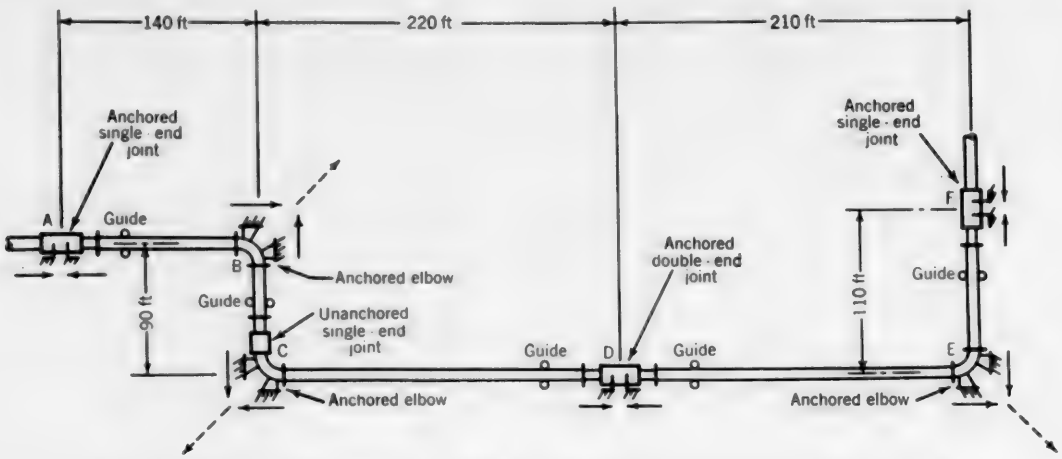


Fig. 6. A typical piping system in which slip-type joints have been used. Procedure for finding traverses, anchor loads, and guide and support locations for this installation is given in detail below.

alignment guides adjacent to the joint are properly located and aligned. When installing expansion joints with anchor bases, use the full number of bolts provided and tighten nuts securely. This is particularly important at end anchors.

If pipe temperature at the time of installation is appreciably higher than the minimum design temperature, expansion joints should be preset to allow for contraction. To do this, the sleeve of a slipjoint should be pushed in from its fully extended position, a distance at least equal to the distance the pipe will contract in going from installation temperature down to the minimum temperature.

Design of Typical System

Figure 6 shows a typical piping system using slip joints, consisting of 8-inch steel pipe with a total length of 770 ft. It carries steam at 125 psig with 25 deg superheat. Procedure for finding traverses, anchor loads, and guide and support locations is as follows:

Traverses: Saturation temperature for 125 psig steam is 355 deg (Fig. 3). Add 25 deg for total temperature range (assuming minimum temperature to be 0 deg) of 380 deg. Expansion for this range is 3.4 inches per 100 ft from Fig. 3.

Span AB = 140 ft; expansion = (140) (3.4)/100 = 4.8 inches. A single-end joint with 8-inch traverse is suitable at Point *A*. Span *BC* is 90 ft long and has expansion of 3.1 inches when figured as above. Hence, joint at *C* is single-end with 4-inch traverse. Span *CE* is 430 ft long with 14.7 inches of expansion. A double-end joint with 8-inch traverse each end is suitable at *D*, the approximate mid-point. Span *EF* is 110 ft long with 3.74 inches of expansion for which a single-end, 4-inch traverse joint will be adequate.

Anchor loads: Intermediate anchors at *A*, *D* and *F* are subject to possible maximum loads of 8,000 lb in both directions. These values are obtained from Fig. 5 for 8-inch pipe. Contraction loads can be taken as equal to the expansion loads but are in the opposite direction.

End anchors at *B*, *C*, and *E* have possible maximum axial loads of 15,000 lb in each leg (solid arrows, Fig. 6). The resultant anchor load is the vector sum of the thrusts in the two legs, or 21,000 lb acting along an axis 45 deg from the pipe axes (dotted arrows, Fig. 6). Maximum contraction loads in the reverse direction consist of friction only—8,000 lb along solid arrows with an 11,300-lb resultant.

Supports and guides: From Table I, assuming joints are internally-externally guided type, install alignment guides not more than 18 ft from slip of each joint and at intervals of 45 ft, more or less, along each span. Also, from Table I, the pipe should be supported at intervals of about 18 ft and wherever concentrated loading exists due to valves and fittings.

The foregoing data and suggestions should prove helpful in the design and installation of expansion joint piping systems. For special and more complicated problems the author suggests consultation with an expansion joint manufacturer.

Plumbing was the key to this

Hotel Modernization Program

Modern hotel practice calls for a private bath with each guest accommodation. Here is how one hotel, built in 1927 as a club for young men, met this dictate with a progressive modernization program in which copper tube plumbing had an important part.

Modern hotel practice calls for a private bath with each guest accommodation. Chicago's Allerton Hotel, like a great many older existing hotels in this country, was built when this concept was considered rather impractical. Furthermore, this hotel was originally conceived as a club for young men, and its design utilized the communal bath facilities suitable to its intended guests.

As a consequence, about 45% of the original rooms had only hot and cold running water. Of the remainder, 25% also had toilets, with the remaining rooms equipped with more complete facilities such as showers or tubs or combinations of these. Even where complete facilities were incorporated in the rooms, fixtures were old-fashioned and, after 30 years of use, the pipes were in an undependable condition. As a result, water pressure was low, and water was sometimes rather unappetizing for drinking or bathing.

The hotel management was interested in attracting more of the transient business existing in Chicago as a "convention city." The YMCA-type setup (See Fig. 1) was entirely unsuited to this type of business. In recent years, from 50 to 60% of the hotel's rooms were filled by permanent guests; larger rooms with private bath would be more attractive to the transient trade. Incidentally, rooms were air conditioned by window units.

Under the direction of general manager Frank Downes, a multiphase program was instituted to install new copper tube plumbing, new fixtures, and to modify, where necessary, the size and layout of rooms to accommodate a separate bath for each.

Job Scheduling

Breaking the job down into phases was based on a number of factors. Most important to the hotel was keeping it in business during modernization. This was possible because the layout of existing plumbing divided the building into four distinct sections. These sections were worked from the bottom up, with two to four floors being modernized at one time. For example, on the 12th floor, walls were being moved and supply, waste and vent lines relocated. In the same area of the 11th floor, bath-

Fig. 1. These photos illustrate the communal shower and toilet facilities which the Allerton Hotel utilized for thirty years due to its original function as a club for young men. All photos, Chase Brass & Copper Co.

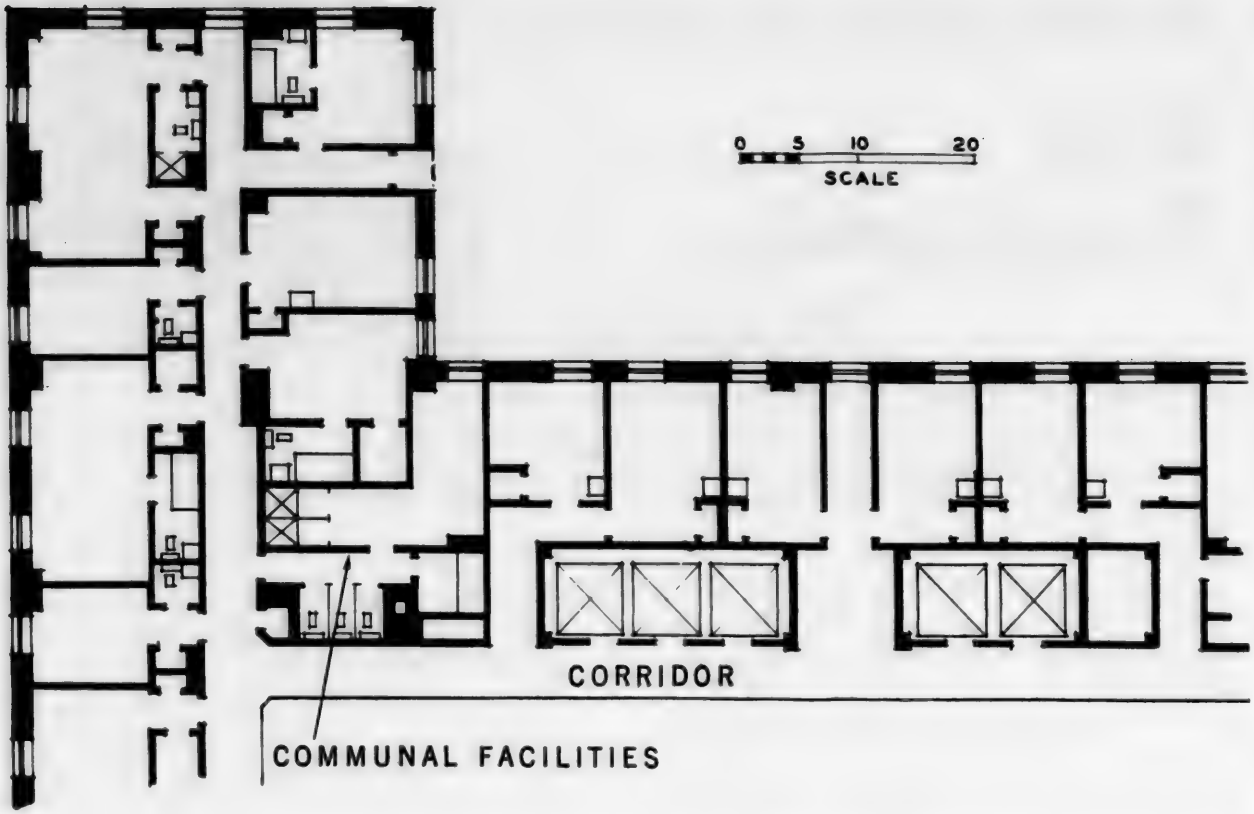


Fig. 2. Diagram above gives a typical floor plan for the Allerton Hotel before modernization. Shown are the communal facilities and the small rooms, most of which had only wash basin or basin plus toilet. These rooms were combined into larger rooms, each with private bathroom, as shown below in floor plan after modernization. Diagrams, Chase Brass & Copper Co.

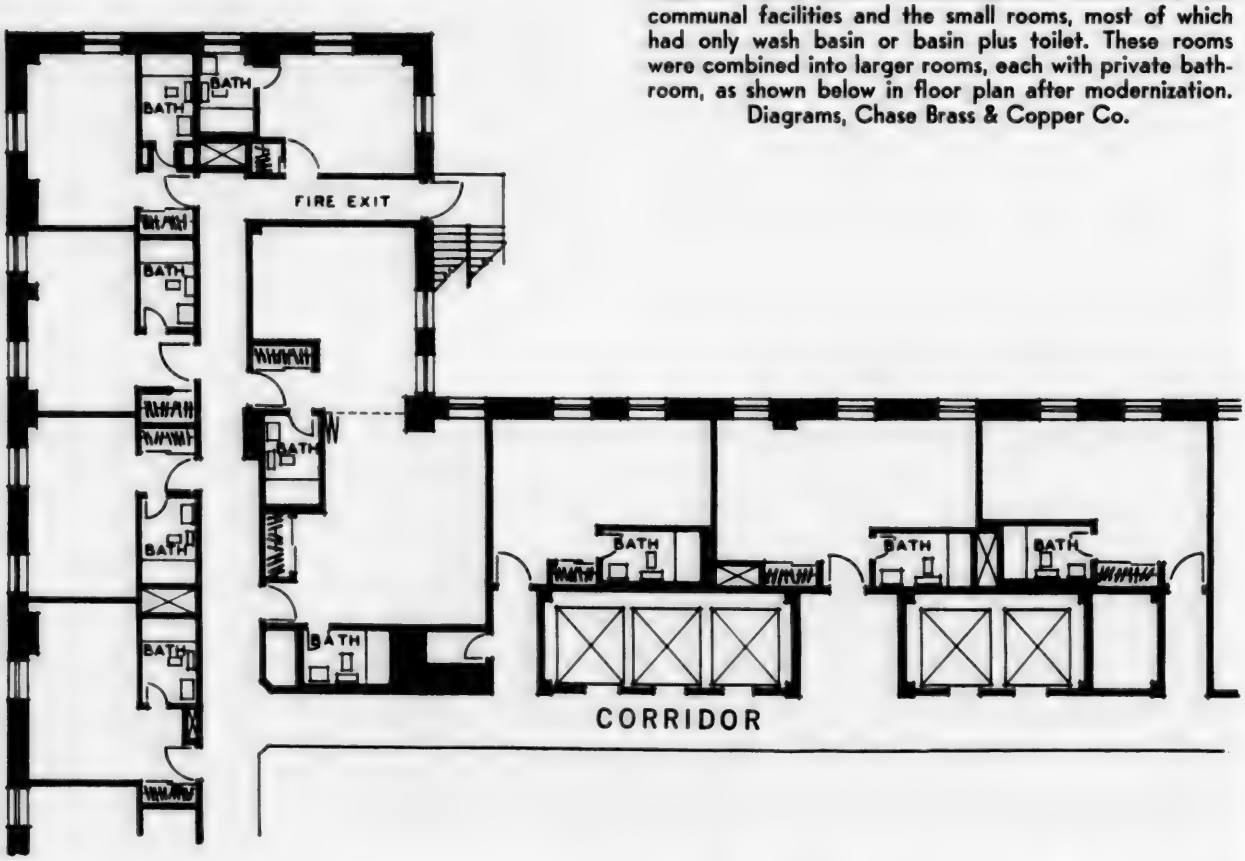


Fig. 3. Adjacent photo shows one of the old single bathless rooms. These were combined into larger rooms, each with modern private bathroom as shown at far right. Note wall extension telephone. All photos, Chase Brass & Copper Co.

tubs were being connected and walls replastered. On the 10th, plaster was being finished, tile set, fixtures connected, and painting started. On the 9th floor, decorating and furniture moving was accomplished to complete the floor for occupancy. Such an arrangement puts only a small portion of the hotel's facilities out of income producing use.

First phase consisted of work on the south side of the building; completion of this phase took almost a year. West and north sides are now being completed as the second phase. Finally, the third phase, on the east side, is planned for completion by the end of 1959. Actually, the first phase also established the total cost of the modernization, and was performed on a cost plus overhead basis.

Modernization Details

Part of the $500,000 first phase of the modernization program was combining many units of three existing hot-and-cold-water rooms into two, with the new rooms provided with the most modern and luxurious bathrooms conceivable. As shown in Fig. 3, features of these baths are pastel fixtures and tile, with a matching wall extension telephone. The first step was taken during February, of 1957, by Safeway Construction Co. and Lake Shore Plumbing Co., both of Chicago.

Fig. 4. A plumbing rough, fabricated to serve the baths of two rooms, nears completion. Walls will then be constructed right around the plumbing.

It was discovered that in order to position the new bathtubs over a supporting beam, corridor walls had to be moved. The walls were relocated approximately 6 inches, which narrowed the halls by only a foot or so, at the most.

A typical rough for the plumbing wall to serve the baths of two rooms is shown nearing completion in Fig. 4. As these partitions are not bearing walls, the copper tube was first put together for the hot and cold water supply, then the waste and vent lines. The stacks for waste and venting are seen coming up in approximately the same location as the old pipe, some of which can be seen in the photo. Following this work, the walls were constructed right around the tube, using ¾-inch channel furring and trussed steel studs, with plaster being applied to wire lath fastened to the furring. These partitions are about 4 inches thick, on the average.

Water supply tube was tacked to the tube used for venting, either by soldering the smaller diameter tube directly or through use of a short bridge of the smaller tube. This establishes and holds the proper pitch, and eliminates the possibility of later vibration.

Partial Results of Program

In addition to the importance of a hotel's being able to provide modern facilities for its guests, one should not neglect the influence of increased income that follows such a modernization program. Rates for new rooms are approximately double that of the old rooms ($4.64 per night for the old single as opposed to $9.00 for a new; $7.80 for an old double and $14.00 for a new). Management estimates that the new rooms will have to be occupied 35% of the time in order to bring in the revenue that the old ones did when completely filled. To date, experience has shown that the new rooms are occupied 72% of the time, so that for the same income 37% of the profits from the new units can be applied toward paying for the modernization program.

New Tool for Engineers:

The One-Minute Camera

EDWARD L. KESSLER
Montgomery Engineering Co., Jersey City, N. J.

A new tool in any trade is most welcome, especially if it really performs the functions of saving time and saving trouble. A tool that can do this and much more for engineers is a camera that can produce a finished print in one minute. Here is one engineer's experience working with such a camera.

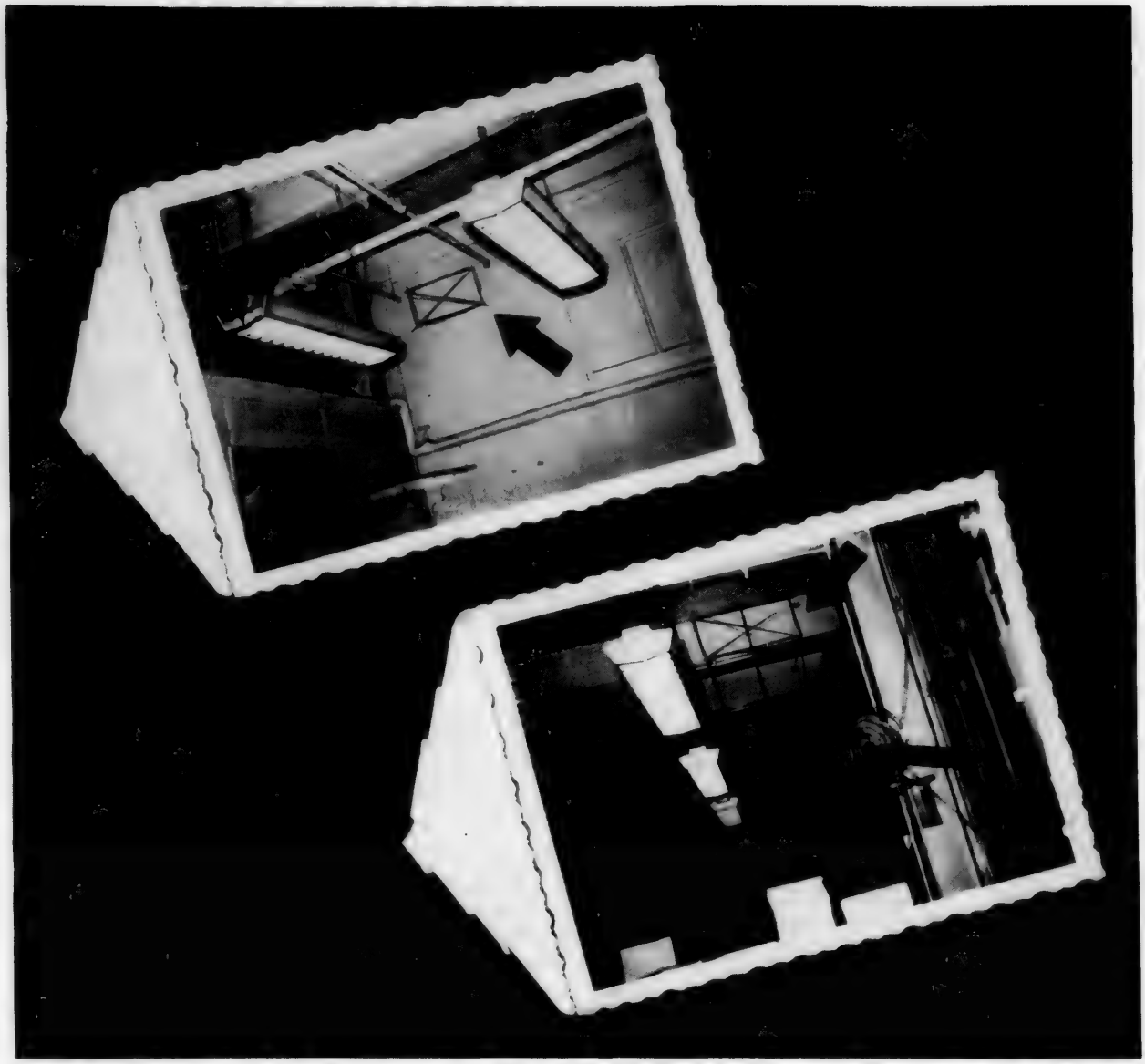
ALONG with a slide rule, scale, and survey pad, a camera is now part of my engineering equipment. I have found photography to be a real aid in planning an air conditioning installation.

I first used my camera (a Polaroid Land Model 95) this way one day when, to put it bluntly, I was stymied. I had to design a duct system in an existing building and was hampered by a multitude of lights, pipes, and sprinkler lines. As I sketched and re-sketched with much frustration, I recalled having my camera in the car, where it rested from the last family outing. I brought it into the building and proceeded to photograph the situation. Since I was able to have prints within a minute, I made rough sketches on the print of how I intended to lay out the installation. From there on, working it into the finished drawings was quite simple. Since this initial use, the camera is always in the car and loaded for action.

In addition to locating duct runs and holes to be cut, I have found many more useful functions. Equipment location in small rooms with obstructions can be laid out more easily if you can recollect the scene with the use of a picture. The photos come in handy for rigging problems, too. Just take a picture of a particular delivery situation, show and explain it to the rigger, and save yourself and the rigger a return trip to the job site. This also applies to other subcontractors, such as sheet metal workers, plumbers, pipefitters and masons.

Measurements can be placed on the finished print and can be scaled for actual conditions. This is extremely helpful in preparing your drawings. Your sketches on the photograph also visualize the finished job for your customer, for you can indicate right on the print where you intend to install the equipment.

My office thinks the camera is a fine tool, for I can show job conditions, progress, and completion by means of photos attached to my regular reports. This keeps them up to date on a particular job, and informed on each problem and how it is solved. There is also an amount



Here are reproductions of two Polaroid prints used by the author in designing an air conditioning installation for an IBM room at Thomas A. Edison, Inc., West Orange, N. J. Arrow in photo at top points to author's ink-sketched lines indicating general location of a hole to be cut in wooden partition. Bottom photo was used to show the proposed path of a run of duct. Actual size of prints was 3¾ inches wide, 2⅞ inches high.

of advertising benefits from the pictures. The progress of a job is shown better in sequence shots than in two pages of copy, and, of course, before-and-after pictures are always effective.

Another way I have used before-and-after photos was to establish certain facts for legal security. Once I took pictures of a roof before the installation of a water tower and gave one copy to the landlord and kept one for our files. After the installation, the same roof was photographed to prove that no damage was done by this particular installation. The landlord had wanted a letter stating that we wouldn't damage his roof, so we established the initial and final condition by photographs and still have the prints on file in our office.

I have found that a Polaroid Land camera is the most suitable for this type of work because it enables you to get your print in one minute. If your photo for some reason doesn't come out well, you know immediately and can reshoot the same scene until you have the desired results. The other advantage of this type of camera is, as mentioned previously, using the print in the field for sketching purposes. My camera is also equipped with a flash attachment for taking those inside shots.

They say a picture is worth a thousand words; in addition, a picture is worth the time and trouble you save by taking it and using it to advantage.

Infra-Red Space Heating

MARC RESEK[1] and FRED J. PRINCE[2]

Gas-fired radiant heaters are relatively new in the United States. A description of the unit is given and its functioning is described. Industrial applications are presented.

HIGH bay, uninsulated industrial buildings and other hard-to-heat spaces are now being heated by gas-fired units, suspended above the space so as to direct infra-red radiation downward onto the floor, machinery, and people in the room. The simplicity and advantages of this method of heating have long been known, but until recently there had been no practical equipment for the purpose.

The ceramic radiant plate, developed by a German scientist, Guenther Schwank, is heated to 1650 deg F by a flame on its surface. A catalytic action of the hot ceramic surface on the gas-air mixture results in exceedingly rapid combustion. The plate is incorporated into a burner in which all air required for combustion is inspirated at the gas orifice. The gas-air mixture burns as it issues through a large number of small holes in the ceramic plate covering the face of the burner. Figure 1 shows one of these infra-red generators.

The ⅜-inch thick ceramic plate is made of material of extremely low thermal conductivity. Its surface is pierced with a large number of small diameter holes, which serve as gas ports. The large total area of the gas ports results in low back pressure in the burner. This makes it possible to induce all air required for combustion as primary air. Low thermal conductivity of the ceramic plate reduces flow of heat from the red hot burner face to the interior of the burner, eliminating danger of backfiring and aiding in maintaining a high surface temperature. Each burner has an input of 12,000 Btu per hr. This is equivalent to 44,750 Btu per hr per sq ft of radiant surface.

Various sizes of heaters are made by combining a number of individual burners (or rayheads) into a single unit with a pilot, gas manifold, automatic control valve and a reflector to direct the radiation into the area to be heated. Figure 2 shows a group of heaters (each with three rayheads) located below the roof of a steel manufacturing building.

Varied Uses

Schwank infra-red heaters are widely used in Europe and have been recently introduced into the United States through a licensing agreement for their manufacture. Here they are most widely used in high bay buildings because of the difficulties of heating with conventional convection methods in such structures. Uninsulated walls, high ceilings, rapid changes due to ventilation requirements, and frequent opening of large doors interfere with satisfactory heat distribution by convection and increase the required input. Radiant heat is a solution to such difficulties. The heat coming directly from the overhead burners warms the floors which reradiate the heat. See Fig. 3. The warm floor and equipment raise the temperature of the air in the lower part of the room

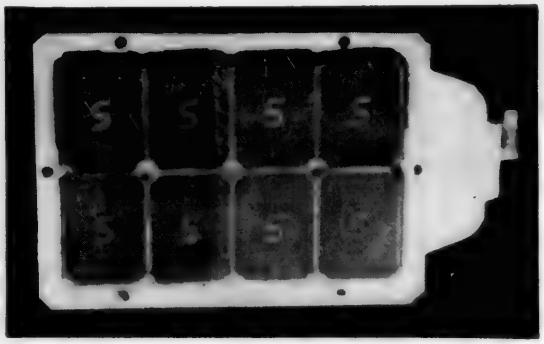


Fig. 1. Underside of infra-red generator.

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[2] Fred J. Prince is manager, Sales Engineering & Service, of Perfection Industries.

Fig. 2. Infra-red heaters installed in steel building. Roof acts as a vent hood for exhaust gases.

and have sufficient flywheel effect to allow the heaters to be turned on and off with thermostats. A comfortable temperature is maintained even during the time the heaters are not burning.

Non-industrial Uses

In addition to its uses for heating industrial buildings, there are many other applications for gas fired infra-red heat. In Europe this type of heater is used in cathedrals, convention halls, arcades, sidewalk cafes, gymnasiums, indoor tennis courts, and sports arenas. Installations have been made in this country in similar places, in skating rinks, auto wash buildings, garages, service stations, and aircraft hangars; on platforms and in shelters at passenger stations; over the players' benches at football fields; in dugouts in baseball parks and in grandstands at race tracks.

Heating with infra-red has considerable appeal for sporting events, where participants should be cool but spectators need some heat. However, outdoor installations must be approached with caution, keeping in mind the effects of the wind on heat requirements and on heater performance.

Other industrial applications may be mentioned, such as heating loading docks; thawing coal and ore railroad cars; preventing condensation on steel in storage, as illustrated in Fig. 4; heating die casting machines, dies and molds; and drying materials and baking paint. Special equipment has been developed for these special applications.

Efficiency

Efficiency of an infra-red heater installation depends upon utilizing the inherent advantages of the type of heat produced and the conditions of the particular appli-

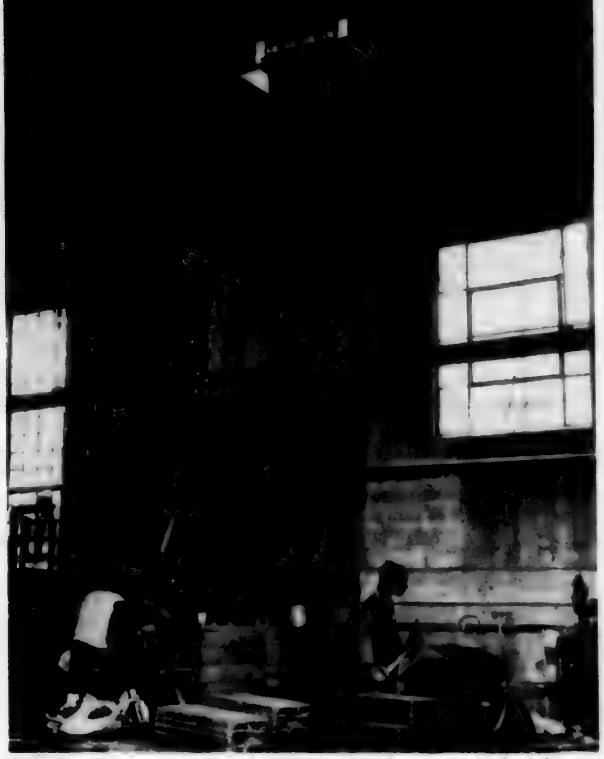

Fig. 3. Generators heat 3200 sq ft from 20-ft height in 35-ft high foundry building. Warm floor reradiates heat.

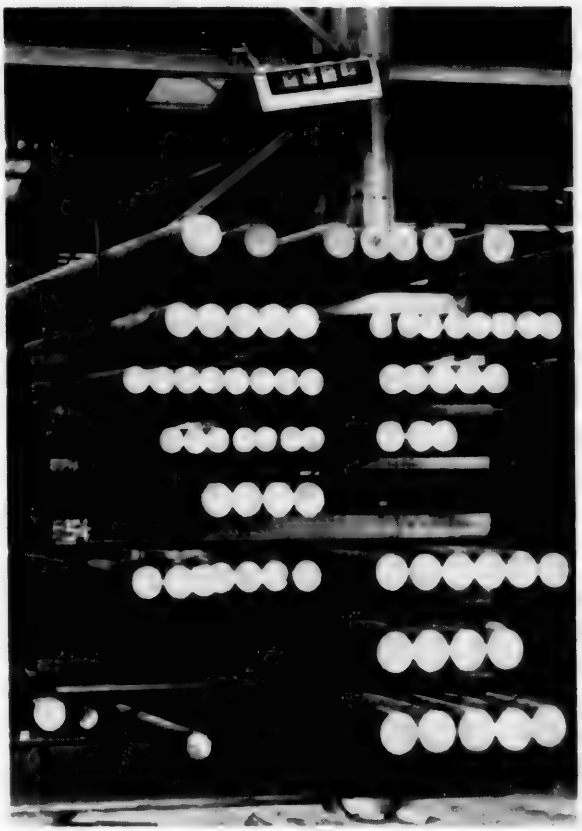

Fig. 4. Angle-mounted on wall, generators check condensation on steel stocks in southern warehouse. Three hours' nightly operation keeps steel 10 deg above dew point.

cation. The most significant increase in efficiency is that radiant heat involves no loss in an intermediate heat-carrying media. Not all fuel energy is converted to useable infra-red radiant heat, however. The percentage depends on the temperature of the radiant surface, shown graphically in Fig. 5. Schwank burners convert 55-60% of fuel energy into infra-red radiation. Combustion is complete, but the balance of the input is carried off as convected heat or leaves the building with the products of combustion, the convected heat warming the upper part of the room.

Higher temperatures, such as that obtained in the filament of an electrical radiant heater, convert more fuel energy into radiation. However, a large portion of this radiation—some of it is visible light—is in wave lengths not readily absorbed by most materials. A 1650-deg temperature represents a practical compromise between maximum radiation and maximum absorption.

Absorption of Radiant Energy

Ability to absorb infra-red radiation and convert it to heat depends upon the wave length of the rays, which varies with the temperature of the radiator as well as the material of the absorbing surface. Aluminum absorbs very little of the 2-6 micron length rays produced by the 1650-deg ceramic. It is used in reflectors for the burners. Quartz or Vicor glass is quite transparent to the 2-6 micron length rays. Concrete and masonry, the most common materials requiring heating, absorb the largest part of the rays emitted by the unit, whereas they reflect shorter light rays.

Designing the Installation

As with any heating system, an infra-red installation must be engineered correctly if it is to do a satisfactory job. This involves determination of the input required, the best arrangement of the units to distribute the heat where it is needed, location of the units to clear cranes or other obstacles, design of supporting members, layout of gas lines and wiring for controls, ventilation arrangements, as well as provisions to facilitate maintenance and service.

Whether natural, manufactured, mixed, or bottled gas is burned, a pressure regulator must be used ahead of the burner as constant gas pressure is necessary for the fixed combustion rate that will produce the 1650-deg plate temperature.

Each burner has a comparatively low output, so many heaters may be required for a large building, each heating a small floor area. The height at which heaters may be mounted depends on the type of building. Heaters may be located high provided reflectors are used to prevent waste of heat on the upper part of outside walls. Heaters near outer walls should be kept as low as possible, and in some cases should be tilted inward. See Fig. 6.

It is important to avoid high concentration of heat on the heads of occupants, so heaters at low levels should be of smaller size (two or three rayheads), whereas heaters at a 20-40-ft elevation can be larger units (four or more rayheads).

The total installed capacity must be sufficient to compensate for heat losses from the area heated, but since these losses are less than for conventional heating, the input to be installed is correspondingly reduced. In buildings of normal ceiling height, average construction, and for 0 deg F design outside temperature, one rayhead for each 100 sq ft of floor space generally does a good job. This gives 120 Btu input per sq ft of floor area. For buildings with high ceilings, leaky walls, no insulation, and similar conditions of high heat loss, the number of heaters to be installed must be increased, while for well insulated buildings and higher design temperatures, the number of units can be decreased.

The highest concentration of heat should be around the periphery of the heated area. For heating spots, or limited areas of large rooms, the capacity installed per square foot must be at least double or triple the amount used when the entire area is heated. In such cases, a number of heaters should be installed around the periphery of the space to be heated. They should have parabolic reflectors and should be inclined toward the center of the area.

While high buildings have higher heat losses per square foot of floor area and require more input than

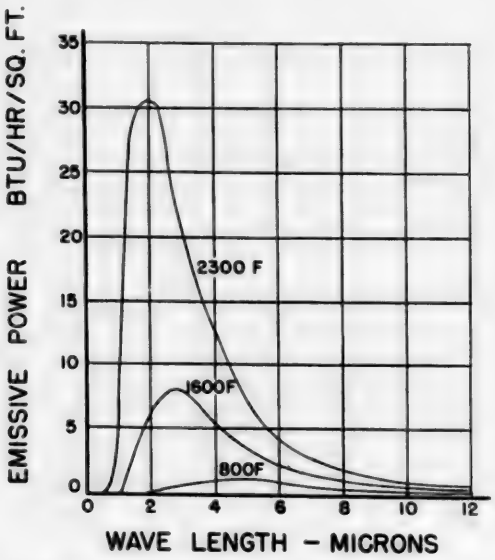

Fig. 5. Area under each curve is quantity of radiation at the specified temperature.

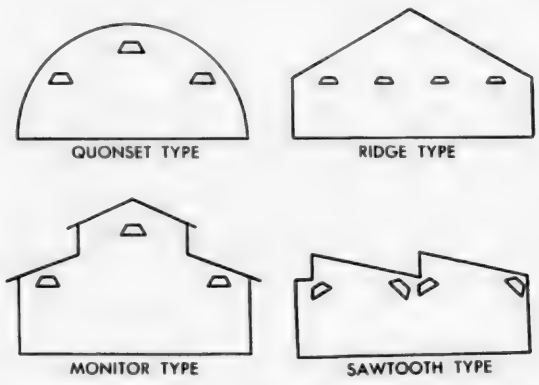

Fig. 6. Building construction determines mounting arrangements.

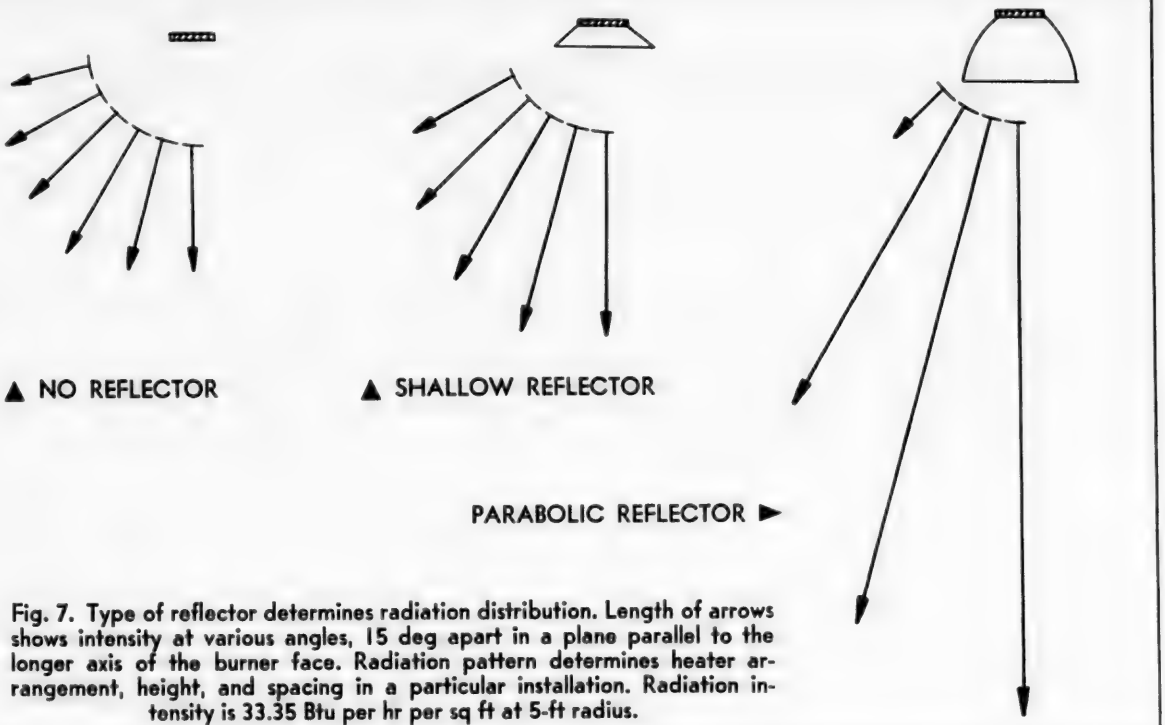

Fig. 7. Type of reflector determines radiation distribution. Length of arrows shows intensity at various angles, 15 deg apart in a plane parallel to the longer axis of the burner face. Radiation pattern determines heater arrangement, height, and spacing in a particular installation. Radiation intensity is 33.35 Btu per hr per sq ft at 5-ft radius.

if they had lower ceilings, the input required is not increased to the extent it would be with convection heating, and high bay buildings show the greatest savings over convection systems.

Reflectors

Infra-red radiation, like light, travels in all directions from the radiant surface and if the radiation is needed in a specific direction, it must be guided by suitable reflectors or shades. There are a number of metals which have high reflectivity for infra-red rays, aluminum being one of the best.

As with light, an unshaded radiant surface will produce a divergent beam, the intensity of the radiation diminishing as the square of the distance from the source. On the other hand, if the radiation source is at the focal point of a parabolic reflector, the radiation will become a straight beam of undiminishing intensity, so that the radiation falling on any surface is the same regardless of its distance from the source of infra-red.

Since the infra-red generator is a surface rather than a point, part of it will be out of focus and the beam will have some scattering.

The pattern of radiation intensity obtained depends on the type of reflector used on the heater. Figure 7 gives the radiation patterns for a heater, which at (a) has no reflector, at (b) is equipped with a shallow angular reflector, and at (c) has a parabolic reflector. The arrows show by their length the intensity of the radiation at various angles (15° apart) in a plane parallel to the longer axis of the burner face.

This radiation pattern must be taken into account in arranging a group of heaters in a room, considering the type of reflector to be used, the spacing of the heaters and the height at which they are located.

Venting

Since these heaters are usually used in high-bay buildings and are installed well above breathing level, and because the large number usually make individual vents impracticable in most installations, vents are usually provided in the roof to carry off combustion products, the entire roof area serving as a large vent hood. Carbon monoxide output is less than 0.02%, the maximum permissible by American Gas Association standards. AGA has approved the Schwank units as unvented heaters.

A minimum 50 sq in. roof vent opening is generally considered desirable for each 100,000 Btu per hr input. This area may change depending upon local or state codes. In any event, sufficient venting, either gravity or powered, is needed to remove all products of combustion. For every 1,000 Btu per hr input, approximately 10 cfh of combustible products are generated. If excessive venting is provided over and above the air changes required, either by conditions or codes, fuel costs will increase.

Moisture in the hot products of combustion will condense if it comes in contact with cold surfaces. Condensation can be prevented by cooling the products of combustion before they reach the cold surface or by warming the cold surface. Cooling can be accomplished by insuring that the units are far enough away from the cold surfaces. Surfaces can be kept at a higher temperature by insulation or by application of heat.

Where gas is a low-cost fuel, as it is in many places, savings with infra-red heating can be substantial. Operating costs are reduced by elimination of boiler room labor. A 25% saving over conventional heating methods is common. Gas radiant heating provides the heating engineer with a superior tool for many applications. This is evidenced by the large number of highly satisfactory installations.

Correct Flow Water Temperatures At Partial Heating Loads

RICHARD L. KORAL
Associate Editor

Curves are presented showing how flow water temperature in hydronic heating systems should vary, as outside temperatures vary from design, to maintain steady indoor comfort. They apply to radiators, convectors, and sinuous coil panels, for several design water temperatures, and for three typical design outside temperatures. They do not apply to applications where forced convection is used.

IN many hot water heating systems, control of radiation during partial load conditions is achieved by a lowering of water temperature to the point where reduced heat emission balances reduced heat losses. The curves of Figs. 2, 3, and 4 give correct flow water temperatures corresponding to different outside temperatures for cast iron radiators and sinuous coil panels. In Figs. 5, 6, and 7, comparable data are given for convectors.

For each curve, that portion to the left of the heavy vertical design outside temperature line is of primary interest, since outside temperatures seldom drop below design outside temperature. The principal value to the heating engineer of these data is in specifying hot water temperature controls. Maximum fuel economy will result when actual water temperatures are close to the theoretically correct temperatures, especially in the range of outdoor temperatures encompassing those encountered most of the time.

Figure 1, a map of average outside temperatures in the United States during a normal heating season,[1] can be used to find the point of operation of the heating system at which maximum fuel economy is the most important. At that point the control manufacturer should guarantee that actual water temperatures be very close to theoretical flow water temperatures, as given in Figs. 2 to 7. One cannot demand that flow water be at the theoretically correct temperature throughout the entire

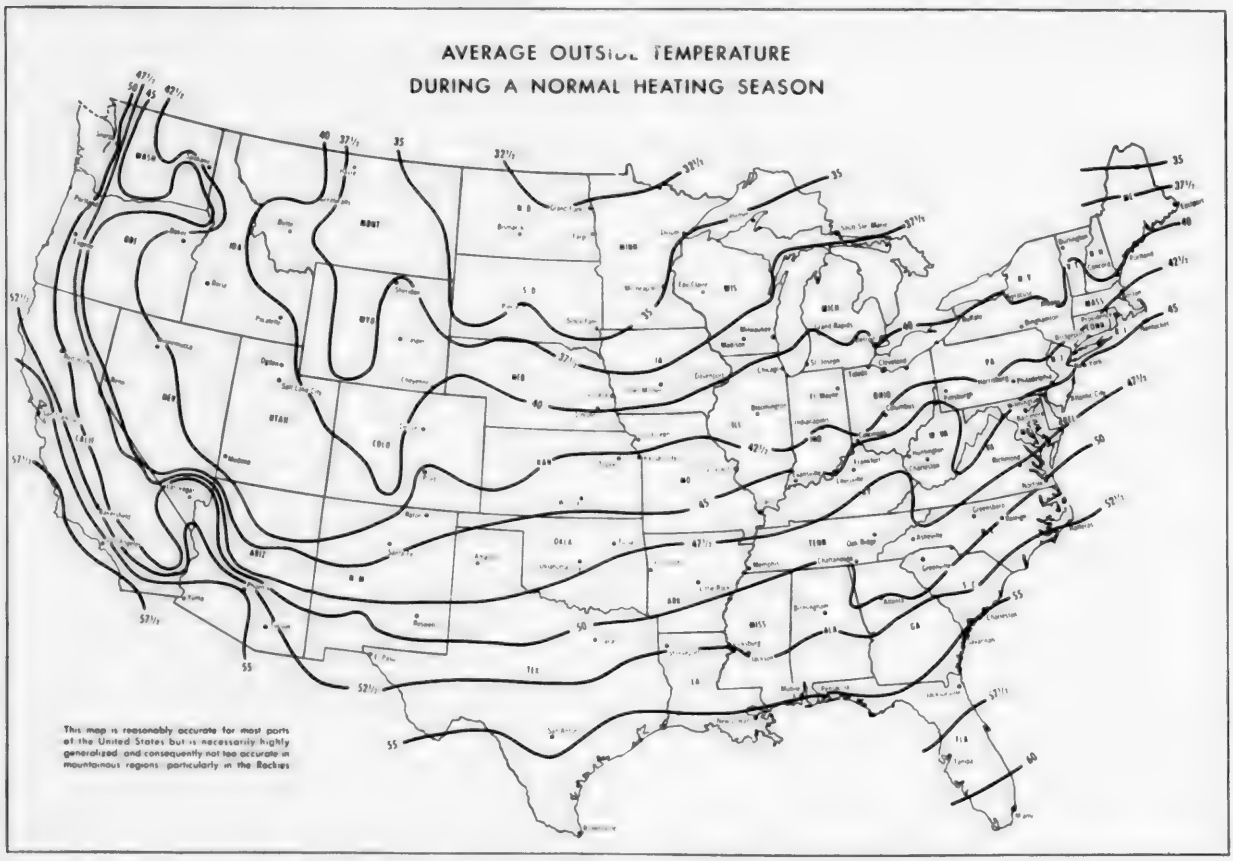
DURING A NORMAL HEATING SEASON
This map is reasonably accurate for most parts of the United States but is necessarily highly generalized and consequently not too accurate in mountainous regions, particularly in the Rockies

Fig. 1. Maximum fuel economy is most important at these temperatures.

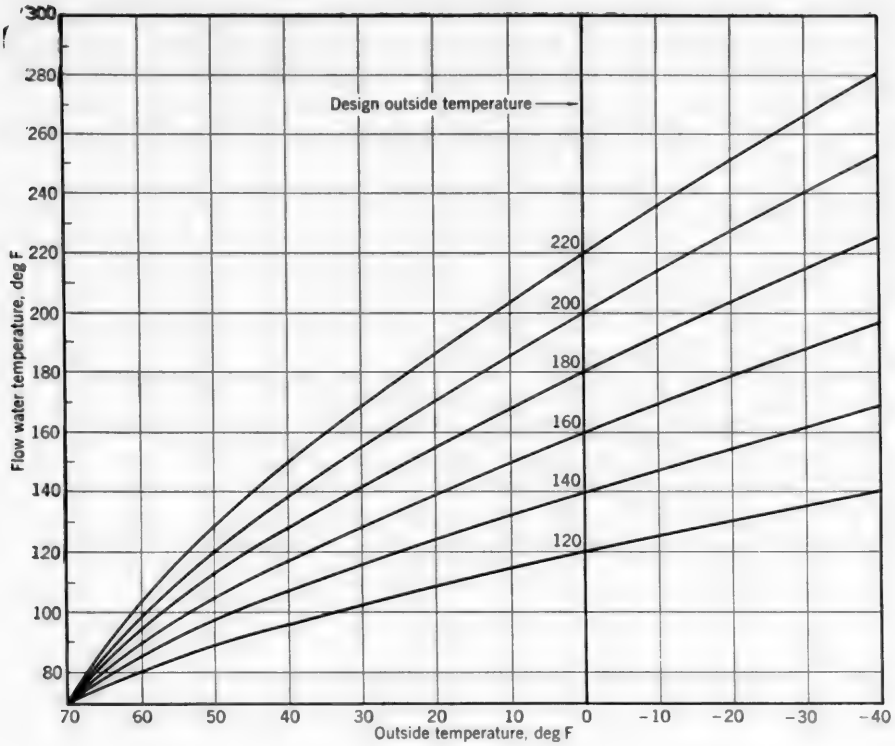

Fig. 2. Correct flow water temperatures for cast iron radiation for various outside temperatures when design outside temperature is 0 deg F.

outside temperature range. However, the degree of agreement between the two, in the region of average outside temperature, is a gage of the effectiveness of the control system.

Tables of average outside temperatures are also available.[2] Also, where such data are available, average outside temperature during the heating season is found by dividing the number of days in the heating season for a particular locality into the normal number of degree-days for that locality.

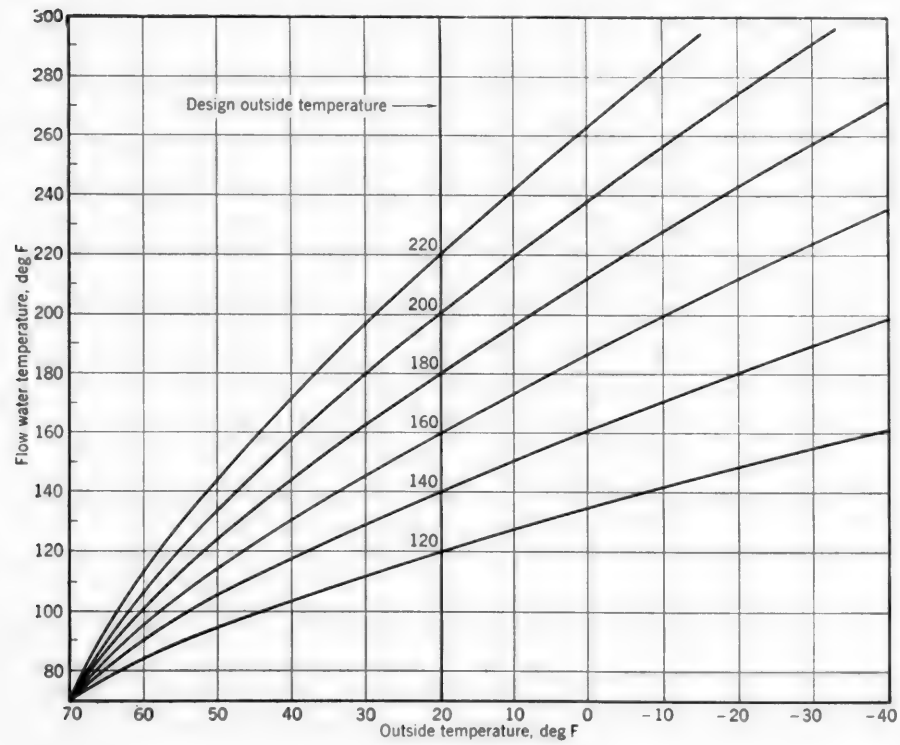

Fig. 3. Correct flow water temperatures for cast iron radiation for various outside temperatures when design outside temperature is 20 deg F.

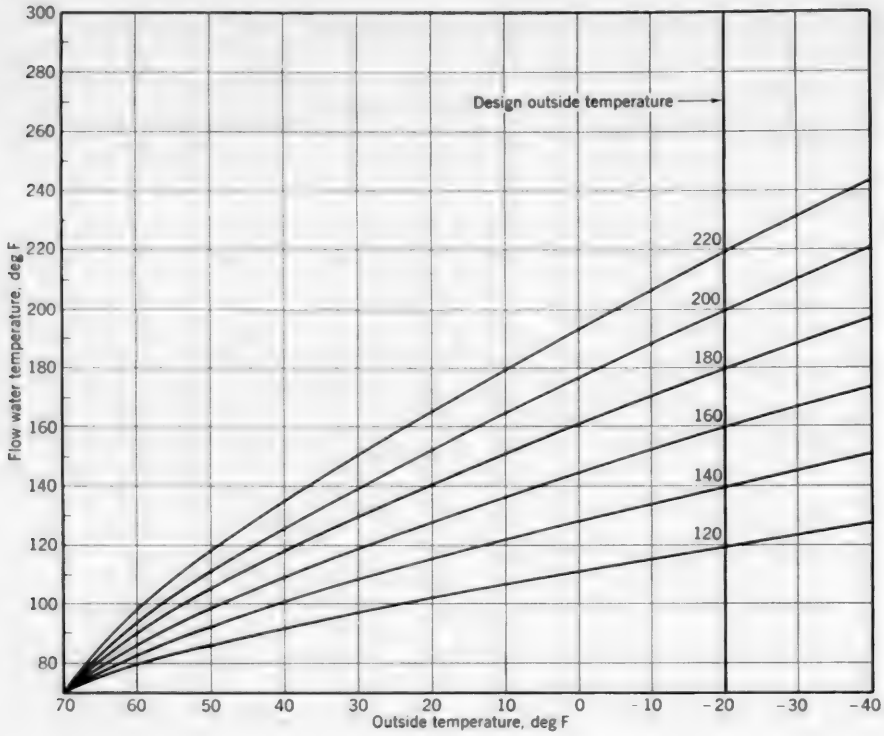

Fig. 4. Correct flow water temperatures for cast iron radiation for various temperatures when design outside temperature is —20 deg F.

Losses in Overheating

Assume a heating plant in New York City sized to deliver 500,000 Btu per hr at 0-deg F design outdoor temperature. Design water temperature is 180 deg, and convectors are used in the space. What will the heat emission be on an average day during the heating season (a) when water temperature is controlled according to theoretical requirements, and (b) when water temperature is 5 deg above theoretical requirements? The answers may be estimated as follows:

From the tables,[3] average outside temperature in New

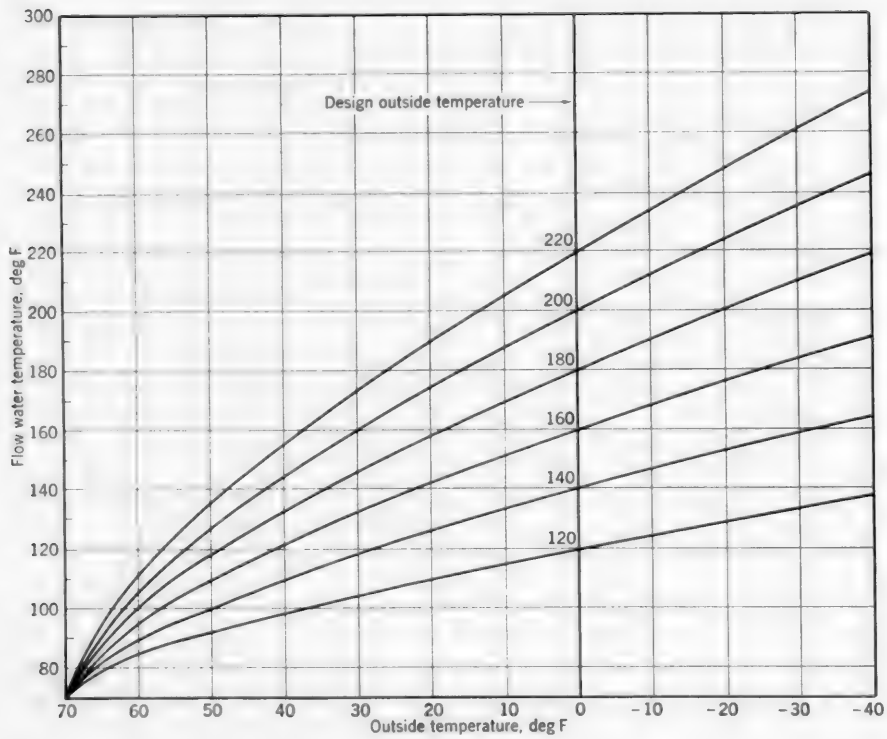

Fig. 5. Correct flow water temperatures for convectors for various outside temperatures when design outside is 0 deg F.

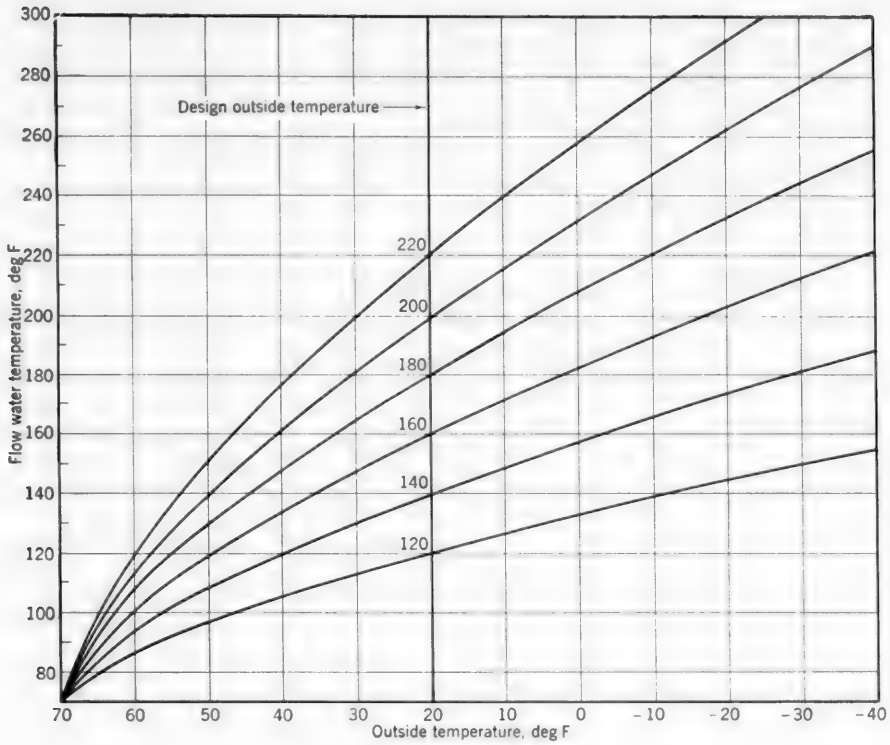

Fig. 6. Correct flow water temperatures for convectors for various outside temperatures when the design outside temperature is 20 deg F.

York City during the heating season is 40.9 deg. From Fig. 5, flow water temperature, which is 180 deg at 0 deg design outside, should be about 131 deg when the outside temperature is 40.9 deg.

In general, the rate of heat emission of a convector varies as the 1.5 power of the temperature difference, flow water to air. (The exponent is 1.3 for cast iron radiators and sinuous coil radiant panels.) Assuming a 70-deg indoor temperature, the rate of heat emission, Q, is

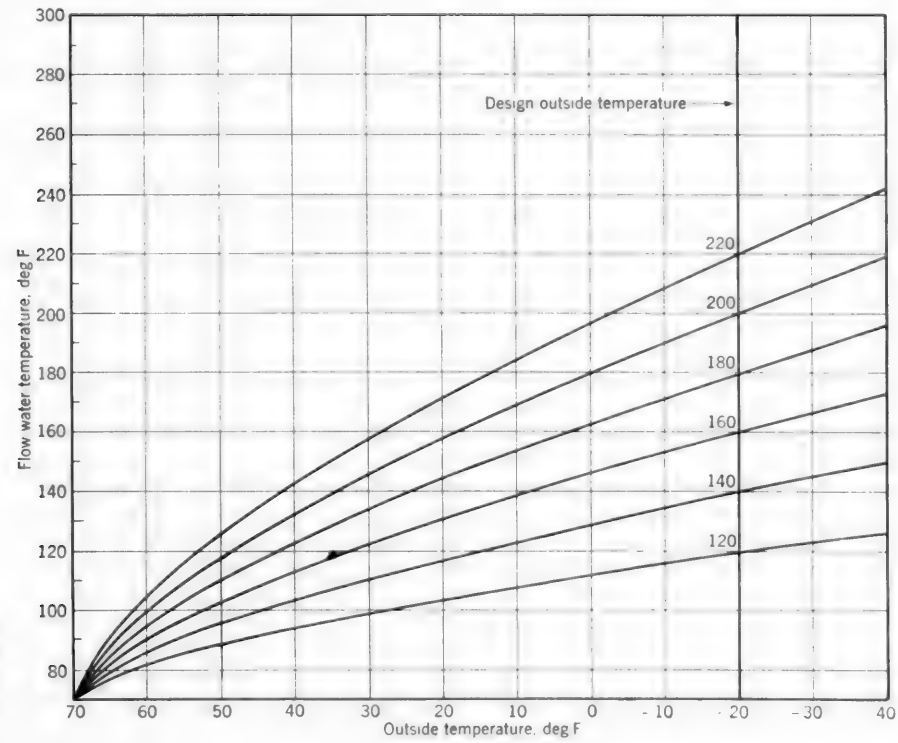

Fig. 7. Correct flow water temperatures for convectors for various outside temperatures when design outside temperature is —20 deg F.

$$Q = 500{,}000 \left(\frac{131 - 70}{180 - 70}\right)^{1.5} = 205{,}000 \text{ Btu per hr.}$$

This figure checks with a heat loss estimate. Since heat loss from the space is proportional to the differences, outside to inside temperatures, the heat loss, *L*, on the average-temperature day will be

$$L = 500{,}000 \left(\frac{70 - 40.9}{70 - 0}\right) = 205{,}000 \text{ Btu per hr.}$$

If, instead of the theoretically correct 131-deg flow water, flow water temperature were 136 deg, heat emission would be

$$Q = 500{,}000 \left(\frac{136 - 70}{180 - 70}\right)^{1.5} = 232{,}000 \text{ Btu per hr.}$$

As tenants of the overheated space open their windows to relieve themselves of the excess heat, at least 27,000 Btu per hr would be wasted to the outdoors, or 13% more fuel would be consumed.

Below Design Outside

Temperatures below design outside are represented in that portion of Figs. 2-7 to the right of the vertical design outside temperature lines. One suggested use for these data is in adjustment of flow water temperatures for existing, inadequate hot water heating systems.

Suppose that a hot water heating installation with cast iron radiators is running continuously when outside temperatures are at or below 20 deg, and that below 20 deg the temperature within the space falls below 70 deg. At 20-deg outside, water temperature is 180 deg. A check of the plant shows it is functioning correctly, but is undersized. Then, in reality, the heating plant has been sized for design outside temperature of 20 deg and should have been sized for, say, 0 deg outside.

The heat transfer characteristics of the system would be represented by that curve of Fig. 3 which intersects the 20-deg design outside temperature line at 180 deg flow water temperature. Following the curve to the right, it is seen that at 0 deg outside temperature comfort conditions will be maintained if the water temperature is 210 deg. A resizing of boiler plant for 210-deg water would probably solve the problem.

The author is indebted to The Journal of the Institution of Heating and Ventilating Engineers, London, which published in its September, 1958 issue a Technical Note prepared by the Ministry of Works, which presented a similar discussion of flow water temperatures for British climatic conditions.

Notes

1. Map taken from page 37, *The Degree Day*, by Clifford Strock, published by Air Conditioning, Heating and Ventilating.

2. See *The Degree Day*, cited above, and *Handbook of Air Conditioning, Heating and Ventilating*, by the same author, published by The Industrial Press, 1959.

3. Page 28, *The Degree Day*, cited in Note 1.

Can You Tell an Anode From a Cathode?

Cathodic protection has proved itself a great time and money saver in protecting underground and underwater metallic structures from corrosion and functional losses. The structures are made to become *cathodic* by the application of direct-current electricity. This electricity flows to them from *anodes* which are located underground or underwater.

What are these anodes? One type commercially available consists of chunks of pure zinc or magnesium weighing from 5 to 150 lb. It comes in rods, blocks, and cylinders, and has the natural property of generating an electric current when metallically connected to a steel structure in the ground or water. This type of anode is called an *electrogenetic* anode because the anode generates electricity.

Another type of anode is a cylinder of carbon, iron, or aluminum which is buried or submerged and is connected to the positive terminal of a direct-current generator or rectifier. The negative terminal is connected to the structure to be protected, and the generator or rectifier forces current to flow *from* the anode *to* the structure. This type of anode is called an *impressed-current anode*.

In both cases, current flows through the ground or water *from* anode *to* cathode, and that is the way to distinguish between these terms. Whenever conventional direct current flows *from* a metallic surface into an electrolyte, that surface is an *anode*. It is then corroding or going into solution. Whenever direct current is flowing *into* a metallic surface from an electrolyte, that surface is a cathode. It is then being protected.

Use of the trems *positive* and *negative* is not recommended in cathodic protection work. A d-c voltmeter connected from an impressed-current anode to the protected structure shows the anode is positive and the structure is negative. However, when the same voltmeter is connected from an electrogenetic anode to the structure under protection, it shows the anode is negative and the structure is positive.

If one compares the carbon-zinc flashlight cell with the lead-acid battery, he finds the negative electrode or zinc shell is always the anode. It corrodes, or goes into solution, when a current flows. The positive electrode or carbon center rod is always the cathode. It is protected and does not corrode or go into solution. The storage battery's negative electrode is the anode when the battery is discharging, but it is the cathode when the battery is being charged. Its polarity does not change, but each terminal can be either anode or cathode.

The anode is always the electrode or area which discharges conventional current into the electrolyte (or gas in an electron tube) and receives it from a metallic circuit. The cathode is always the electrode or area which receives current from the electrolyte (or gas in an electron tube) and discharges it into a metallic circuit.

If the above explanation is remembered, and the use of the terms *positive* and *negative* is avoided, there should be no confusion regarding the term *cathodic protection* as used in protecting metals from corrosion.

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How the user may obtain

Purchased Fan Performance

HENRY GEISSLER
Sturtevant Division, Westinghouse Electric Corp., Hyde Park, Mass.

Poorly designed fan inlet connections may be the limiting factor in obtaining full fan output. This article will indicate why such a condition can exist and how this condition can be corrected without changing the drive, increasing the speed, and consuming additional fan horsepower.

FAN selection is based on the static pressure for a given volume of air which is calculated from the resistance of various components of the system such as filters, hoods and duct work. The calculation of the total system resistance is, at best, an inexact science; therefore, although the volume of air desired may be known very accurately, the static pressure requirements for the given volume flow may be difficult to calculate exactly. In most instances, safety factors are added to the best calculated resistance giving a static pressure requirement higher than that actually required. If the actual system pressure requirement for a given volume flow is known, the characteristic curve of the system can be calculated. For most normal systems, this curve is a parabola with its origin at zero volume, zero pressure, with the pressure varying as the square of the volume. Thus, if the volume flow through a given system is doubled, the pressure required will be four times greater.

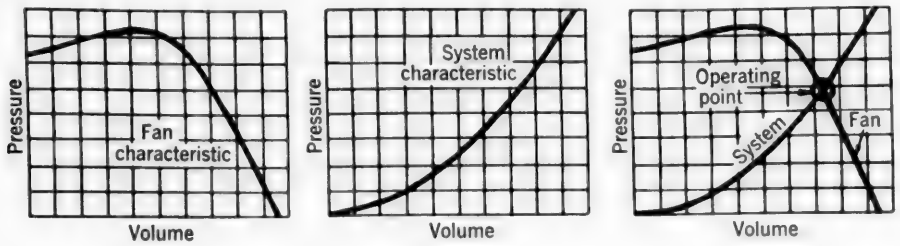


Fig. 1. Use of fan and system characteristics to determine the operating point for a fan.

Characteristics Curve

A fan at a given rpm has a characteristic pressure volume curve from wide open volume to block tight. Superimposing the characteristic curve of the fan on the curve of the system, the intersection of these two curves is the point of operation and is the only point on the system at which the fan can operate. This is shown graphically in Fig. 1.

Vaned elbows within the system will result in a more accurate determination of these draft losses and will result in a saving in air horsepower. In addition, vaned elbows, whether remote from the fan or at the fan inlet, eliminate uncontrolled spin effect and add only nominal established pressure drops.

Vane Detail

By using the pattern of vaned elbows shown in Figs. 2, 3, and 4, draft losses at elbows can be reduced as much as 25%. The pressure drop through them may be assumed as 25% of a velocity pressure head.

A vane detail is illustrated in Fig. 2. Following is an explanation of the letters used:

D — dept of duct, inches

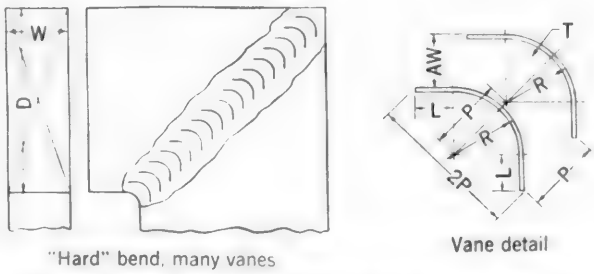


Fig. 2. Hard bend with many vanes and details for a vane.

W — width of duct, inches

N — number of vanes = 6 D/W − 1

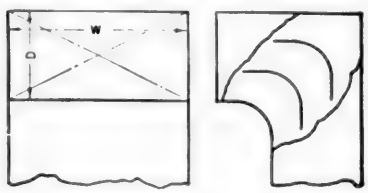


Fig. 3. Easy bend with few vanes.

If *N* solves a fraction, use the next larger integer

AW — axial width = D/(N + 1)

P — pitch = AW x 1.41
R — radius = AW x 1.28
L — AW x 0.75
T — thickness = AW/16 or less

Two specific examples of design, based on conditions illustrated in both Figs. 2 and 3 are shown for ready reference in Table 1.

Ratings

The ratings of centrifugal and axial fans manufactured by the Westinghouse Electric Corporation are based upon laboratory test, as defined by the Standard Test Code of AMCA successor to the National Association of Fan Manufacturers. The prescribed test of a double inlet fan with air inlet boxes is performed with the fan arranged according to Fig. 4. It is apparent from this illustration that air flow to and from the fan completely fills the ducts and that air spin and turbulence is completely eliminated.

TABLE 1—TWO SPECIFIC EXAMPLES OF DESIGN

Refer to Fig. No.	N	D	W	AN	R	T	P	L
		Inches						
2	17	60	20	3.33	4.26	0.21	4.7	2.5
3	2	20	40	6.66	8.53	0.41	9.41	5.0

By comparison, most field installations do not approach these conditions; yet, by following a few simple rules of air flow, full fan capacity can be assured to give a good application.

The flow of air entering the fan inlet must be uniform in velocity and enter parallel to the sides of inlet box fans and fans with field fabricated intakes, or uniformly from all directions in open inlet fans.

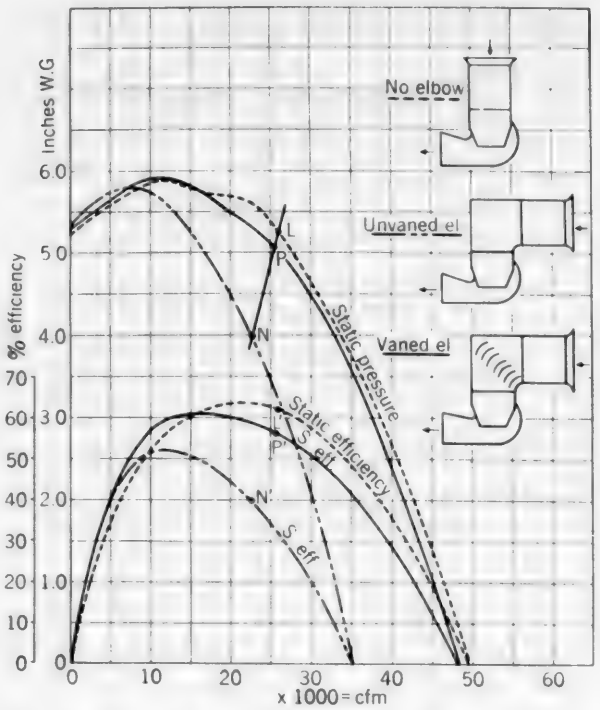


Fig. 5. Effect of inlet connection on fan performance.

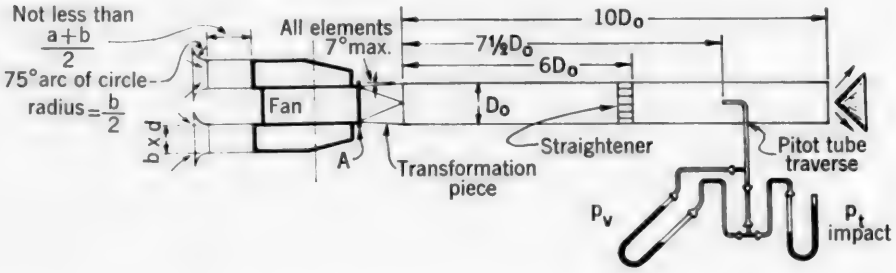


Fig. 4. Laboratory test arrangement for centrifugal fans, single or double inlet equipped with inlet boxes.

Symbols

In this illustration, Fig. 4 the following letter symbols are used:

a = long side of inlet duct
b = short side of inlet duct
d = diameter of wheel in feet
D_o = diameter of outlet duct in feet

For the duct, p_t = total pressure by impact tube and p_v = velocity pressure or the differential reading between the impact tube and the static tube.

Corrections

Bad elbow connections located near fan inlets can create uncontrolled spin of the entering air which, in effect, will change the angle of attack of the wheel blades upon the air and prevent the fan from developing the pressure for which it was selected.

The loss is not merely the equivalent of a duct below loss. The resulting decrease in capacity and efficiency cannot be calculated as both the pressure and efficiency characteristics of the fan will have changed.

In Fig. 5 the dash line, curve *L*, represents the unobstructed inlet code test static pressure over the full range from no-delivery to free-delivery: *L'* the corres-static efficiency.

When the flow is through a 90 deg turn before reaching the inlet boxes, the volume, pressure and efficiency valves become those shown on Curves *N* and *N'* (although the fan itself has not been changed.)

If now the diagonal of the 90-deg elbow inlet connection is fitted with properly designed corner turns, the greater part of the lost performance is restored, as shown in full line curves *P* and *P'*.

ITEMS IN LABORATORY PIPING PRACTICE

The following pointers on laboratory piping design were suggested by Earl Gieser, Superintendent, Murray Hill, N. J., research laboratories of Air Reduction Co., Inc.:

1. Nitrogen, oxygen, propane, compressed air, city gas, and acetylene are generally piped into the laboratory; while carbon dioxide, carbon monoxide, argon mixtures, helium, hydrogen, methane, and butane are brought to the point of application in cylinders.

2. The following piping materials are usually specified for the listed applications:

Black iron—city gas, nitrogen, compressed air, steam, and propane. Valves one inch and under are globe type, 1¼ inch and over, gate.

Galvanized iron—water, with screwed galvanized fittings.

Aluminum—distilled water.

Copper and Brass—oxygen; small size hot and cold water lines; and condensate and refrigeration lines, using Type K or L copper tubing with sweat joints.

PVC—soil, basic chemicals.

High silicon cast iron—soil waste.

Glass—all chemicals, with the exception of fluorine compounds.

3. Condensation is a problem only in compressed air piping. Both electro-drying and aluminum oxide drying are used before general distribution throughout the laboratory.

4. Internal flexible connectors and internal stiffeners are required in vacuum lines.

5. Threaded joints and unions may be specified for all low-pressure lines and for all lines 1½ inches and under. Soldered and welded joints are specified for all high pressure lines and for piping 2 inches in diameter and over. Among piping compounds used are "Permatex," "Expando," "Plastic Lead Seal," litharge and glycerine.

6. A blow-out is provided where an accumulation of gas will cause an explosion, so that no sudden build-up in pressure can do injury to the building or its occupants.

7. A fresh air intake and roof venting are provided for acid drains, as per local code.

8. Recommended pressure on gas cocks to Bunsen burners is 4 inches of water, approximately 10 cfh.

9. For certain processes the hot water supplied to the rest of the laboratory must be given an extra Btu content, usually accomplished by the addition of steam. Provision should be made for thorough mixing of the steam and hot water.

10. Flash-back arrestors are provided for acetylene and propane.

11. Valves are provided at the base of each riser and at each take-off.

12. Lines are pitched in symmetrical, pitched groups.

13. A neat, symmetrical arrangement of piping behind lab benches is favored.

14. Refrigeration and high pressure runs are made as short as possible.

15. Cold and hot water lines, refrigeration lines, and steam lines should be insulated.

16. A piping identification system is a tremendous aid to maintenance.

17. Adequate valving on all piping is also of great assistance to maintenance.

18. Quick-connecting fittings are recommended as a considerable labor saver in installation. This is especially valuable in a laboratory where many set-ups are temporary.

19. Flow diagrams are essential to good installation.

20. Pressure-reducing valves or regulators are essential at process locations.

21. Waste trappings must be properly located to prevent a backing up of fumes.

FORMULAS FOR SIZING CONTROL VALVES

The valve flow coefficient, C_v is the standard measure of valve flow capacity, defined as the number of U. S. gallons of water per minute that will flow through the valve in a wide open position with a pressure drop of 1 psi. The C_v rating is determined by flow tests.

While present valve sizing procedures are based on incomplete assumptions and theory, without its use sizing of valves, especially control valves, would be highly complicated. For most engineering purposes, the following procedures, as outlined by Ralph A. Rockwell, Valve Div., Minneapolis-Honeywell Regulator Co., are justified:

To determine valve size,

Given: All flowing conditions.

Solve: For C_v and select valve size for the type of valve under consideration from manufacturer's table of C_v rating vs. valve size.

To determine valve capacity,

Given: C_v and flowing conditions.

Solve: For capacity V in U. S. gpm of liquid
Q in cfh gas at 14.7 psia and 60 deg F.
W in lb of steam per hr.

For liquid—

$$C_v = V\sqrt{G/\Delta P}$$

$$V = C_v\sqrt{\Delta P/G}$$

where

V = flow, gpm (U. S.)
ΔP = pressure drop at maximum flow, psi
G = specific gravity (water 1.0)
C_v = valve flow coefficient

When flowing temperature is above 200 deg, use specific gravity and quantity at flowing condition.

For gas—

$$C_v = Q\sqrt{G\,T_a}/1360\sqrt{(\Delta P)\,P_2}$$

$$Q = 1360\,C_v\sqrt{(\Delta P)\,P_2}/\sqrt{G\,T_a}$$

where

Q = cu ft per hr at 14.7 psia and 60 deg F
ΔP = pressure drop at maximum flow, psi $(P_1 - P_2)$
P_1 = inlet pressure at maximum flow, psia
P_2 = outlet pressure at maximum flow, psia
G = specific gravity (air = 1.0)
T_a = flowing temperature, absolute (460 + F)
C_v = valve flow coefficient

When P_2 is less than ½ P_1, use the value of $P_1/2$ in place of $\sqrt{(\Delta P)\,P_2}$

For steam—

$$C_v = WK/3\sqrt{(\Delta P)\,P_2}$$

$$W = 3\,C_v\sqrt{(\Delta P)\,P_2}/K$$

where

W = lb steam per hr
ΔP = pressure drop at maximum flow, psi
P_1 = inlet pressure at maximum flow, psia
P_2 = outlet pressure at maximum flow, psia
$K = 1 + (0.0007 \times$ F superheat$)$
C_v = valve flow coefficient

When P_2 is less than ½ P_1, use the value of $P_1/2$ in place of $\sqrt{(\Delta P)\,P_2}$

The steam formula has been set up using $1/0.00225\,P_2$ in place of the specific volume to eliminate the need for steam tables.

Note: Flow of compressible fluids through a restriction reaches a saturation velocity when the differential pressure is increased to approximately 50% of the inlet pressure. This critical pressure ratio varies with the composition of the fluid. The average value of one-half the absolute inlet pressure is well within the tolerance established by the formulas.

For vapors other than steam—general formula-weight basis—

$$C_v = (W/63.4)\sqrt{v_2/\Delta P}$$

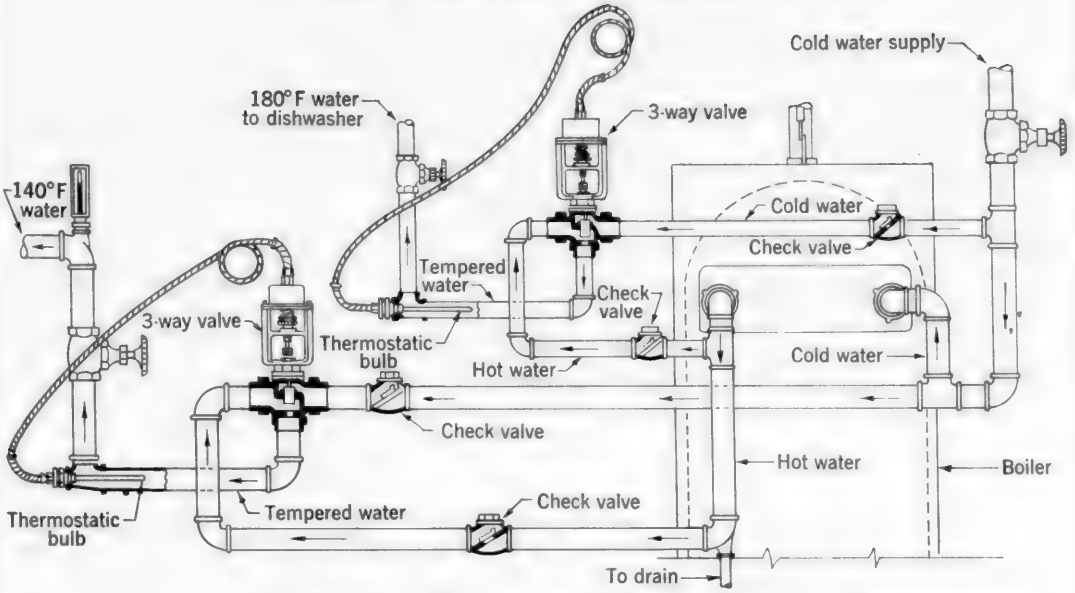
$$W = 63.4\,C_v\sqrt{\Delta P/v_2}$$

where

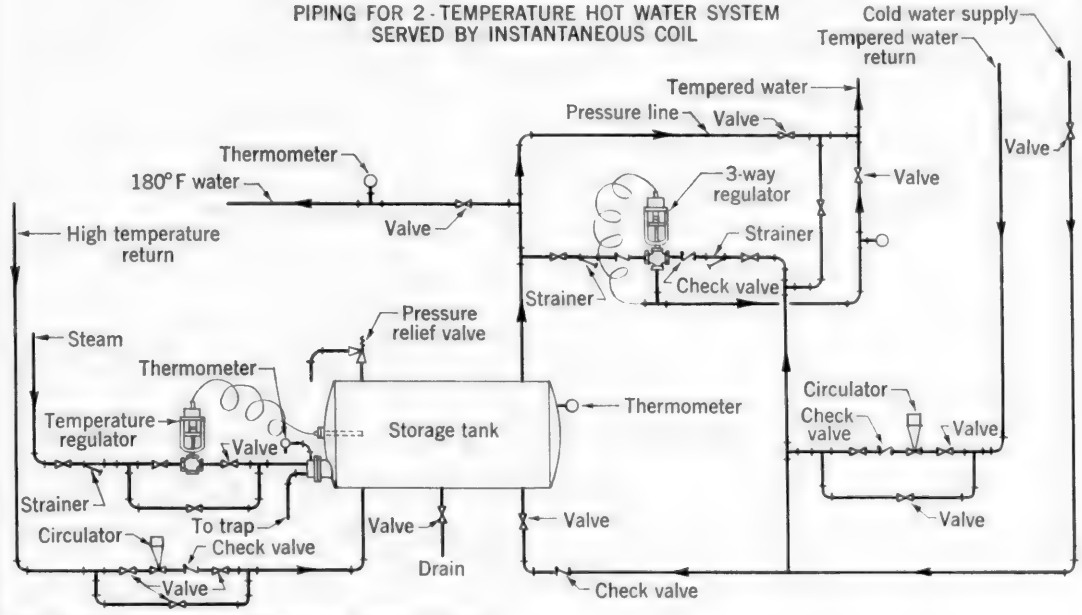
W = lb vapor per hr
ΔP = pressure drop at maximum flow, psi $(P_1 - P_2)$
v_2 = specific volume (cu ft per lb) at outlet pressure P_2
P_1 = inlet pressure at maximum flow, psia
P_2 = outlet pressure at maximum flow, psia
C_v = valve flow coefficient

When P_2 is less than ½ P_1, use the value of $P_1/2$ in place of (ΔP) and use P_2 corresponding to $P_1/2$.

PIPING FOR TWO-TEMPERATURE HOT WATER SYSTEMS



PIPING FOR 2-TEMPERATURE HOT WATER SYSTEM SERVED BY INSTANTANEOUS COIL

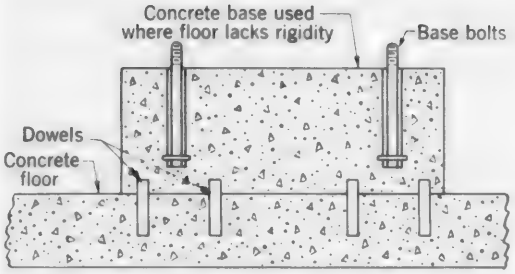


Note: Thermometer on tempered line must be at least 6 feet from bulb to be truly indicative of temperature going to building

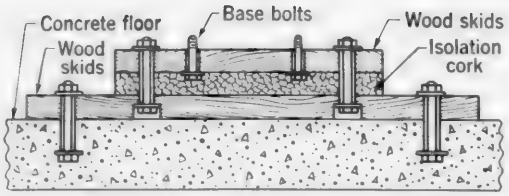
PIPING FOR 2-TEMPERATURE HOT WATER SYSTEM WITH STORAGE TANK

Drawings Courtesy of
Lawler Automatic Controls, Inc., Mount Vernon, N. Y.

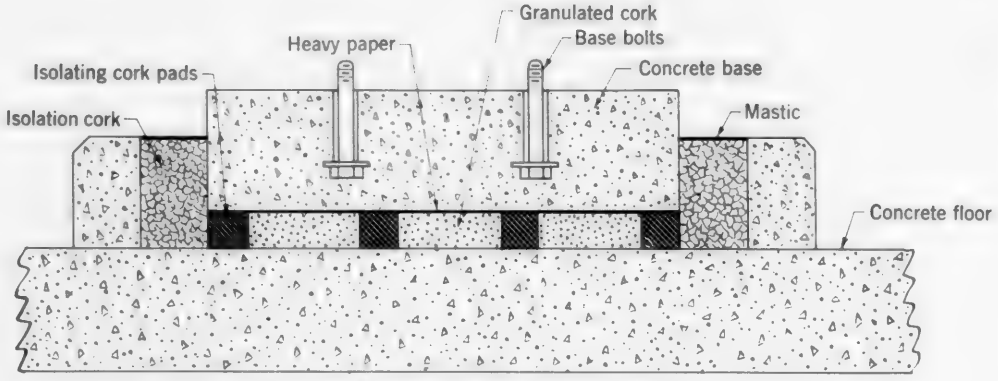
MOUNTINGS FOR REFRIGERATION COMPRESSORS



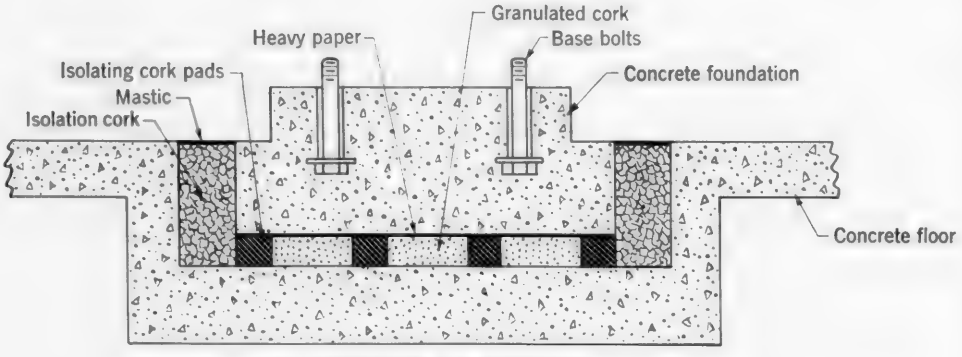
METHOD OF ANCHORING CONCRETE BASE TO FLOOR SLAB



WOOD SKIDS FOR MOUNTING SMALL COMPRESSORS



SURFACE FOUNDATION FOR MOUNTING SMALLER COMPRESSORS



PIT FOUNDATION FOR MOUNTING LARGE COMPRESSORS

Drawings Courtesy of
Worthington Corp., Harrison, N. J.

Commercial Kitchen Ventilation

and the Effect of Cooking Appliances on Air Conditioning Design

EDGAR A. JAHN
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Basic factors are covered that determine the required capacity for fans installed as part of a kitchen exhaust system. Information is given on how gas or electric cooking appliances affect the ventilation and air conditioning requirements of the kitchen and dining areas. An extensive table is included which gives the maximum heat gain from appliances located in an air conditioned area.

GOOD ventilation is as essential in the commercial kitchen as it is in the dining area where customers are served. Excessive heat in the kitchen decreases the efficiency of cooks. Clouds of steam hamper work in all departments, especially near dishwashers. Cooking odors in the dining room make a "hash house" of an otherwise top grade establishment; excess heat, smoke and grease-laden vapors must be removed before they permeate the kitchen and serving area and create a serious cleaning and cooling problem. Good ventilation eliminates all of these problems and earns money through savings on redecorating costs and reduced labor turnover and absences.

Kitchen ventilation may consist of anything from an open window up to a complicated hood and duct exhaust system with adequate provision for the introduction and conditioning of replacement air. For many years the installation of an exhaust fan has been accepted practice for removing heat, odors and grease-laden vapors produced in the cooking process. In many cases, the capacity of these exhaust fans was determined by rule-of-thumb methods and no consideration was given to their effect on the heating or cooling system required for other areas. Also no provision was made for admitting fresh air to replace that which was being exhausted.

Results of Negative Pressure

During the winter, when all windows in the kitchen are kept closed, the exhaust fan creates a negative pressure in the kitchen and dining area with the following adverse results:

1. Reduced capacity of the exhaust fan.
2. Improper venting of water heaters, space heaters or other individually vented gas appliances in the building.
3. A rush of cold air into the dining area whenever entrance doors are opened.

Today, due to the installation of summer and winter air conditioning in most restaurants, the kitchen ventilation system must be engineered correctly to give satisfactory results at a minimum operating cost. The objectives of a ventilation system are to provide clean fresh air for the dining room and kitchen, to maintain comfortable air temperatures and humidities, and to effectively exhaust all odors, moisture, and grease vapors so that they will not mar the kitchen and permeate into the dining area.

Methods for Sizing Hood Exhaust Fans

Because of the absence of any completely acceptable engineering formula, exhaust fan capacities are usually calculated by one of two simple methods. Both of these methods can be classified as rule-of-thumb, but experience with thousands of installations has shown that they will result in fan sizes that are reasonably satisfactory for the average kitchen.

1. The first method is to size the exhaust fan so as to provide a given number of air changes in the kitchen each hour. The reasoning is that if the entire air volume in a kitchen is exhausted every 2 or 3 minutes and replaced with fresh air, the kitchen temperatures will be maintained at a comfortable level and the air velocity across the face of the hood will be high enough to effectively remove cooking odors and vapors. As a result, exhaust fans are sized to provide 20 to 30 air changes per hour. The higher figure is generally used in restaurants where the size of kitchen is small as compared with the total heat input to the cooking appliances. On the other hand, many institutional and hotel kitchens are relatively

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large in volume and, in such cases, 20 to 25 air changes are normally satisfactory. In calculating the cubical content of the kitchen, it is customary to use the over-all dimensions of the room with no deduction for the volume occupied by refrigerators, storage cabinets and appliances.

2. A variation of the air change method of sizing is the one used by the General Services Administration, some municipal codes and other sources. This simplification calculates fan size based on 4 cfm per square foot of floor area. A few check calculations will quickly show that this figure results in the same fan capacity as 20 air changes for any kitchen having a 12 ft ceiling height.

3. Another commonly used method of sizing exhaust fans is based upon maintaining a fixed velocity across the entire area of the hood opening. Again, there is a range of acceptable design figures depending upon the type, size and location of the kitchen. In hospitals or large institutions where the kitchen is not adjacent to the dining room, a design velocity as low as 50 fpm may be used, while restaurant kitchens may require a velocity of up to 100 fpm.

4. A somewhat simpler calculation to arrive at a similar result is to use 250 to 500 cfm per lineal foot of cooking equipment.

For purposes of comparison let us apply the various design figures to a typical small hospital kitchen:

Kitchen dimensions—20 ft x 30 ft x 13 ft

Length of cooking appliances—12 ft

Hood dimensions—4.5 ft x 14 ft

Solution:

Method 1—20 air changes per hour

$$\frac{20\text{ ft} \times 30\text{ ft} \times 13\text{ ft} \times 20}{60\text{ minutes}} = 2600\text{ cfm}$$

Method 2—4 cfm per square foot of floor area

$$20\text{ ft} \times 30\text{ ft} \times 4 = 2400\text{ cfm}$$

Method 3—50 fpm per square foot of hood area

$$4.5\text{ ft} \times 14\text{ ft} \times 50 = 3150\text{ cfm}$$

Method 4—250 cfm per lineal foot of cooking equipment

$$12\text{ ft} \times 250 = 3000\text{ cfm}$$

In these sample calculations, note that the required exhaust fan capacity varies from a low of 2400 cfm to a high of 3150 cfm, depending upon the method used. In many cases it is possible to have even more than this 31% difference. It is for this reason that the Veterans' Administration, and many independent designers, make the calculation on the basis of an assumed air velocity per square foot of hood area and then check the result to insure 20 to 25 air changes per hour. This is sound practice and calls for selecting fan capacity on whichever method results in the larger requirement in cubic feet per minute.

It is sometimes falsely stated that the exhaust fan capacity for hoods located over gas cooking appliances must be greater in order to handle the volume of combustion products. A few quick calculations will quickly disprove this idea.

A typical heavy duty gas range with oven below will have a gas input of 100,000 Btu per hour and will measure 32 inches wide and 42 inches deep. The exhaust hood over this range would measure 3′ x 4′ or 12 sq ft. As previously discussed, an average typical air velocity across the face of the hood might be 80 fpm and the exhaust fan capacity would be 80 × 12 or 960 cfm. Since air for combustion would have to be exhausted from the kitchen anyway, the only additional load imposed on the exhaust sytem is the volume of gas burned, which is 100,000 Btu per hour divided by 1000, or the heating value of natural gas. The gas volume is, therefore, 100 cu ft per hour, or only 1.67 cfm, which is less than two-tenths of one per cent of the 960 cfm required by the hood and of no significance whatever. Even if the entire volume of combustion products were used in the calculation, the percentage figure would be less than 2% of the required fan capacity and, again, a negligible amount. The number of ranges used in the above calculation would make no difference in the percentages since the ratio of total gas input to the required fan capacity remains unchanged.

EFFECT OF KITCHEN EXHAUST ON DINING ROOM AIR CONDITIONING

As pointed out earlier, proper sizing of the exhaust system will not provide satisfactory kitchen ventilation if provision is not made to effectively introduce replacement air. This air must be provided in sufficient quantity; it must be carefully distributed so as to prevent drafts; and it must be conditioned as required by the winter and summer variations in outside air temperature.

To balance out the ventilation system, replacement fresh air must be introduced to both the kitchen and dining area in such proportions that a slight negative pressure will exist in the kitchen. This is necessary to assure a moderate movement of air from the dining area into the kitchen to prevent cooking odors from entering the dining room.

If the restaurant is not air conditioned, it is common practice to draw most, if not all, of the replacement air from the dining area. If the restaurant is air conditioned, however, it is desirable to reduce the amount of air taken from the dining area so as not to put too heavy a load on the air conditioning equipment. For air conditioned restaurants it is common practice to supply 50% of the replacement air from the dining area and the remaining 50% directly into the kitchen from outdoors. In no case, however, should the quantity of air drawn

BUILDING TYPE SECTION

Installation of ranges, fryers, ovens and broiler for employee's cafeteria, home office of Dun & Bradstreet, New York City. Courtesy of S. Blickman, Inc.

from the dining area be less than that required for proper ventilation in the restaurant. In the absence of specific ventilation requirements in local codes, a fresh air supply of 15 cfm per person is a good figure for restaurant occupancy. This means that for a 100 seat restaurant, a minimum of 1500 cfm will be drawn from the dining room to partially make up for the air being exhausted from the kitchen by the ventilation system.

This minimum 1500 cfm represents a basic, necessary load on the air conditioning system since an equivalent amount of fresh air must simultaneously be introduced into the dining area. This replacement air must first pass through the air conditioning apparatus and be cooled, filtered and dehumidified in order to maintain the restaurant in the desired comfort zone. At outside design conditions of 90 deg F d.b. and 75% relative humidity, this 1500 cfm would require over 6.5 tons of refrigeration to bring it to room conditions of 80 deg d.b. and 65% r.h., or 4.5 tons for each 1000 cfm of fresh air.

The all-important point to understand is that the only additional load on the air conditioning system that is chargeable to the kitchen ventilation system is any air volume drawn from the dining room that is over and above that required to supply fresh air for the people load—which in our example was 1500 cfm. It must further be remembered that such extra volume is dependent upon the exhaust system design and is in no way related to the type of fuel or energy used in the cooking appliances. As was previously illustrated, the kitchen exhaust system was sized so as to maintain sufficient air velocity at the appliances to effectively remove heat, odors and cooking vapors. Appliance fuel or energy consumptions never entered into the calculations and hence the type of fuel used in cooking equipment has no effect on the size or operating cost of air conditioning equipment used to condition the air in the dining area.

EFFECT OF HOODED COOKING APPLIANCES ON AIR CONDITIONED KITCHENS

In recent years a trend is developing to air condition the kitchen area as well as the dining room. At present this practice is chiefly confined to the better restaurants, hotels and institutions, but this group does represent an important market so let us analyze what effect the choice of fuel has on the kitchen air conditioning load.

To rationalize this situation it is assumed that the exhaust hood over the cooking appliances is properly designed and located and that the exhaust fan capacity meets the requirements previously outlined.

This being the case, the cooling load attributable to the exhaust fan is that required to condition a quantity of replacement air equal to the exhaust fan capacity minus that volume of fresh air supplied to the dining room for ventilation purposes and exhausted through the kitchen. Furthermore, this cooling load is identical regardless of the type of fuel or energy used for the cooking appliances. As previously shown, the type of fuel or energy does not affect the cfm rating of the exhaust fan or the exhaust system design. As a result, the only possible effect the choice of fuel used for cooking could have on the cooling load of a kitchen is that resulting from a difference in the heat released to the kitchen by the appliances.

Actual field studies of electric and gas commercial kitchens have repeatedly shown that 1 Btu of electricity is equivalent to 1.6 Btu of gas for cooking purposes. At first glance, this would seem to indicate that gas appliances must, therefore, release 60% more heat to the kitchen than electric equipment, but this is an erroneous conclusion. The added heat input required with gas appliances is made necessary to compensate for the difference in heating efficiency between them and comparable electric appliances. This additional heat is not ab-

sorbed by the appliance, but is contained in the products of combustion which are exhausted through the flue outlets of the equipment.

If the gas cooking appliances are connected to a flue, all of this heat in the combustion products will be directly vented to outdoors and never enter the kitchen. If they are not directly flue-connected, the equipment must be installed under an exhaust hood which will again evacuate all flue gases and prevent them from releasing heat to the kitchen. This is so because the flue outlets of commercial cooking gas appliances are located at the top of the high shelves and about 6 ft above the floor level. Since the National Board of Fire Underwriters' Code for the Installation of Heat Producing Appliances requires that hoods shall not be more than 7 ft above the floor, the flue outlets are only about 1 foot below the hood inlet. Therefore, natural draft plus the pull of the exhaust blower insure total venting of the flue products and the heat contained therein.

This being the case, the effect of gas and electric cooking appliances on the kitchen cooling load will be identical for similar equipment and, for practical purposes, will be all sensible heat, due mainly to radiation from the hot surfaces of the appliances. The convected heat and latent heat in the cooking vapors should be removed at the source by a properly designed exhaust hood. A conservative estimate as to the maximum heat released into the kitchen due to radiation is 32% of the maximum hourly Btu input to the appliances.

The magnitude of this maximum hourly input can be safely estimated as 50% of the total rated input of the appliances as supplied by the manufacturer. Numerous demand studies made in both large and small commercial kitchens by gas and electric utilities have shown that the diversity of cooking appliance use and the effect of thermostatic controls, limit the peak 15 or 30 minute heat input to 50% of the equipment rating. For purposes of estimating cooling loads involving a number of different type cooking appliances, a "usage factor" of .50 can be well substantiated. Therefore, the maximum hourly heat gain for electric appliances can be determined from the following equation:

$$\text{(1) Heat Gain (Btu per hr)} = \text{Rated Input (Btu per hr)} \times \text{Usage Factor (0.50)} \times \text{Radiant Heat Factor (0.32)}$$

or

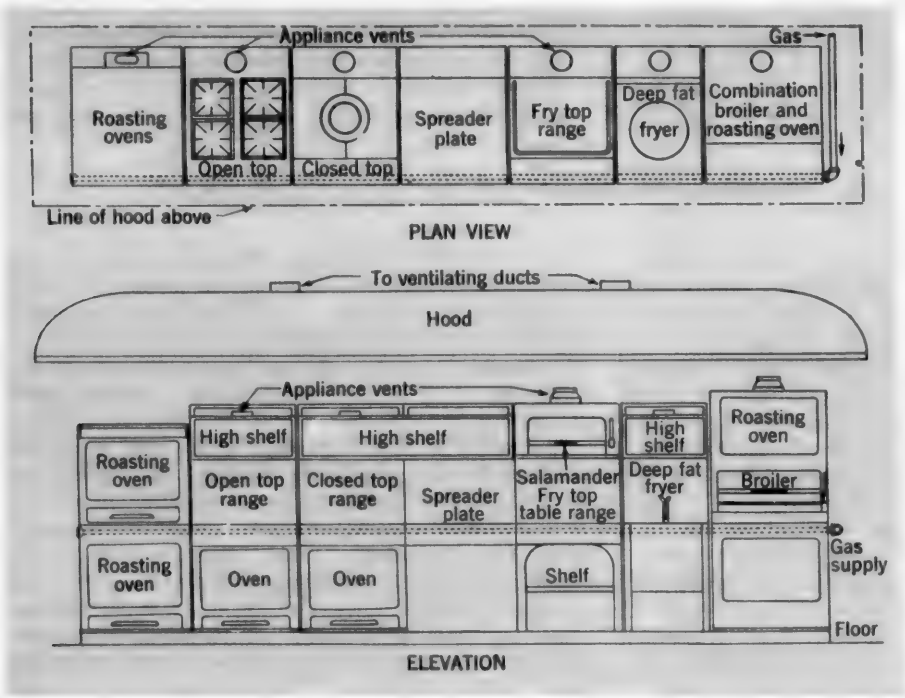
$$\text{(2) Heat Gain (Btu per hr)} = \text{Rated input (Btu per hr)} \times 0.16$$

As already pointed out, the 60% higher input ratings of gas appliances compensate for the difference in heating efficiencies of gas and electric cooking appliances. This input rating differential required 1.6 Btu of gas to provide for equivalent equipment performance as obtained with 1 Btu of electricity. The added heat is exhausted directly outdoors and is not transferred to the appliance or the kitchen. Thus the net heat input to the cooking appliances and to the kitchen is independent of the fuel. This being the case, it is necessary to correct equation (1) when used with gas appliances. To do this, we must divide the right side of the equation by a "flue loss factor" of 1.6 which corrects for the heat contained in the combustion products that are completely exhausted to outdoors. The equations for gas appliances thus become:

$$\text{(3) Heat Gain (Btu per hr)} = \frac{\text{Rated Input (Btu per hr)} \times \text{Usage Factor (0.50)} \times \text{Radiant Heat Factor (0.32)}}{\text{Flue Loss Factor (1.6)}}$$

or

$$\text{(4) Heat Gain (Btu per hr)} = \text{Rated Input (Btu per hr)} \times 0.10$$



The most common types of gas-fired cooking appliances. Vent outlets are located about one foot below the face of a canopy hood.

A typical canopy hood located over gas and steam cooking appliances.

The simplified equations (2) and (4) provide an easy and quick solution to the problem of estimating the cooling load chargeable to electric and gas cooking appliances located under an exhaust hood. It is only necessary to total the Btu input ratings for all the appliances and multiply them by 16%, in the case of electric equipment, or 10% if gas is the fuel.

Table 1 lists average inputs for typical gas and electric cooking appliances and the last column shows the probable sensible heat gain when an exhaust hood is used.

EFFECT OF UNHOODED COOKING APPLIANCES

While it is a penny-wise, pound-foolish policy to install any heat-producing appliances in an air conditioned area unless the equipment is located under a good exhaust hood, this discussion would be incomplete if it did not recognize that such installations are sometimes made where small counter-type cooking appliances are involved.

In this case, the same "usage factor" of 0.50 must be applied to the rated input of an appliance to determine the probable maximum hourly input. Thus, 50% of the rated input will be released to the room in the form of sensible and latent heat. This will be true for both gas and electric appliances, assuming that the gas equipment is unvented.

The problem in estimating heat gain for unhooded appliances is not in calculating the total heat, but rather in establishing what percentage of the total is sensible heat and how much is latent heat. Based on knowledge of the type of fuel or energy used, the type of cooking operation, the amount of moisture in the flue gases, available laboratory test data and other factors, the probable sensible and latent heat ratio was calculated for cooking appliances and applied to the "probable maximum hourly input" column of Table 1. On some devices such as a frying griddle, where the ratio of sensible to latent heat would vary greatly depending on the type of food being cooked at any moment, the sensible heat load was assumed to be 66% and the latent heat load 34% of the total.

Columns 8 and 9 of Table 1 reflect these calculations and assumptions, and are a good guide for estimating heat gains from unhooded and unvented counter cooking appliances. The magnitude of the heat gains, however, should serve only to prove conclusively that it is a most expensive luxury to operate cooking appliances in an air conditioned space, unless the equipment is located under a properly designed exhaust hood. The higher initial cost for air conditioning equipment and the greatly increased operating cost, make the use of unhooded appliances impractical, to say the least.

Summary

For ready reference, the following summarizes the major points of interest in the article.

1. A properly designed kitchen ventilating system is essential for air conditioned food service establishments.
2. Exhaust fans should be sized to provide an air velocity of 50 to 100 fpm across the face of the hood, or 20 to 30 air changes per hour in the kitchen, whichever is greater.
3. The required exhaust fan capacity for hoods over cooking appliances is the same, regardless of whether gas or electricity is used for cooking.
4. The type of fuel or energy used in cooking appliances located in the kitchen has no effect upon the air conditioning load for the dining area.
5. The heat gain to the kitchen due to gas or electric cooking equipment is the same, providing the appliances are located under a properly designed exhaust hood. For practical purposes, all of this heat gain is due to radiation and, therefore, sensible heat.
6. The heat gain to the kitchen for hooded cooking appliances is estimated at 10% of the rated hourly input for gas equipment and 16% for comparable electric appliances.
7. The "usage factor" to determine the "probable max-

TABLE I — MAXIMUM RATE OF HEAT GAIN FROM APPLIANCES LOCATED IN THE AIR CONDITIONED AREA

(See Notes 1 and 2, page 96)

Appliance	Capacity	Overall Dim., Inches Width x Depth x Height	Miscellaneous Data Dimensions in Inches	Mfr's Input Rating		Probable Max. Hourly Input Btu per Hr	Recommended Rate of Heat Gain, Btu per Hr			
							Without Hood			With Hood
				Watts	Btu per Hr		Sensible	Latent	Total	All Sensible
Gas Burning, Counter Type, Restaurant Appliances										
Broiler-griddle		31 x 20 x 18			36,000	18,000	11,700	6,300	18,000	3,600
Coffee brewer										
per burner			With "warm" position		5,000	2,500	1,750	750	2,500	500
Water heater burner			With storage tank		11,000	5,500	3,850	1,650	5,500	1,100
Coffee urn	3 gal.	12-inch dia.			10,000	5,000	3,500	1,500	5,000	1,000
	5 gal.	14-inch dia.			15,000	7,500	5,250	2,250	7,500	1,500
	8 gal. twin	25-inch wide			20,000	10,000	7,000	3,000	10,000	2,000
Deep fat fryer	15 lb fat	14 x 21 x 15			30,000	15,000	7,500	7,500	15,000	3,000
Dry food warmer per sq ft of top					1,400	700	560	140	700	140
Griddle, frying per sq ft of top					15,000	7,500	4,900	2,600	7,500	1,500
Short order stove, per burner			Open grates		10,000	5,000	3,200	1,800	5,000	1,000
Steam table per sq ft of top					2,500	1,250	750	500	1,250	250
Toaster, continuous	360 slices/hr	19 x 16 x 30	2 slices wide		12,000	6,000	3,600	2,400	6,000	1,200
	720 slices/hr	24 x 16 x 30	4 slices wide		20,000	10,000	6,000	4,000	10,000	2,000
Gas Burning, Floor Mounted Type, Restaurant Appliances										
Broiler, unit		24 x 26 grid	Same burner heats oven		70,000	35,000				7,000
Deep fat fryer	32 lb fat		14-inch kettle		65,000	32,500				6,500
	56 lb fat		18-inch kettle		100,000	50,000				10,000
Oven, deck, per sq ft of hearth area			Same for 7 and 12 high decks		4,000	2,000	Exhaust hood required	Exhaust hood required	Exhaust hood required	400
Oven, roasting		32 x 32 x 60	Two ovens—24 x 28 x 15		80,000	40,000				8,000
Range, heavy duty		32 x 42 x 33								
Top section			32 wide x 39 deep		64,000	32,000				6,400
Oven			25 x 28 x 15		40,000	20,000				4,000
Range, Jr., heavy duty		31 x 35 x 33								
Top section			31 wide x 32 deep		45,000	22,500				4,500
Oven			24 x 28 x 15		35,000	17,500				3,500
Range, restaurant type										
Per 2-burner sect.			12 wide x 28 deep		24,000	12,000				2,400
Per oven			24 x 22 x 14		30,000	15,000				3,000
Per broiler-griddle			24 wide x 26 deep		35,000	17,500				3,500

View of the kitchen in the

TABLE I (continued) MAXIMUM RATE OF HEAT GAIN FROM APPLIANCES LOCATED IN THE AIR CONDITIONED AREA

Appliance	Capacity	Overall Dim., Inches Width x Depth x Height	Miscellaneous Data Dimensions in Inches	Mfr's Input Rating		Probable Max. Hourly Input Btu per hr	Recommended Rate of Heat Gain, Btu per Hr			
							Without Hood			With Hood
				Watts	Btu per hr		Sensible	Latent	Total	All Sensible
Electric, Counter Type, Restaurant Appliances										
Coffee brewer										
Per burner				625	2,130	1,000	770	230	1,000	340
Per warmer				160	545	300	230	70	300	90
Automatic	240 cups per hr	27 x 21 x 22	4-burner + water htr.	5,000	17,000	8,500	6,500	2,000	8,500	2,700
Coffee urn	3 gal			2,000	6,800	3,400	2,550	850	3,400	1,000
	5 gal			3,000	10,200	5,100	3,850	1,250	5,100	1,600
	8 gal twin			4,000	13,600	6,800	5,200	1,600	6,800	2,100
Deep fat fryer	14 lb fat	13 x 22 x 10		5,500	18,750	9,400	2,800	6,600	9,400	3,000
	21 lb fat	16 x 22 x 10		8,000	27,300	13,700	4,100	9,600	13,700	4,300
Dry food warmer, per sq ft of top				240	820	400	320	80	400	130
Egg boiler	2 cups	10 x 13 x 25		1,100	3,750	1,900	1,140	760	1,900	600
Griddle, frying, per sq ft of top				2,700	9,200	4,600	3,000	1,600	4,600	1,500
Griddle-Grill		18 x 20 x 13	Grid, 200 sq. in.	6,000	20,400	10,200	6,600	3,600	10,200	3,200
Hotplate		18 x 20 x 13	2 heating units	5,200	17,700	8,900	5,300	3,600	8,900	2,800
Roaster		18 x 20 x 13		1,650	5,620	2,800	1,700	1,100	2,800	900
Roll warmer		18 x 20 x 13		1,650	5,620	2,800	2,600	200	2,800	900
Toaster, continuous	360 slices/hr	15 x 15 x 28	2 slices wide	2,200	7,500	3,700	1,960	1,740	3,700	1,200
	720 slices/hr	20 x 15 x 28	4 slices wide	3,000	10,200	5,100	2,700	2,400	5,100	1,600
Toaster, pop-up	4 slice	12 x 11 x 9		2,450	8,350	4,200	2,230	1,970	4,200	1,300
Waffle iron		18 x 20 x 13	2 grids	1,650	5,620	2,800	1,680	1,120	2,800	900
Electric, Floor Mounted Type, Restaurant Appliances										
Broiler, no oven			23 wide x 25 deep grid	12,000	40,900	20,500	Exhaust hood required			6,500
With oven			23 x 27 x 12 oven	18,000	61,400	30,700				9,800
Deep fat fryer	28 lb fat	20 x 38 x 36	14 wide x 15 deep kettle	12,000	40,900	20,500				6,500
	60 lb fat	24 x 36 x 36	20 wide x 20 deep kettle	18,000	61,400	30,700				9,800
Oven, baking, per sq ft of hearth			Compartment 8-inch high	500	1,700	850				270
Oven, roasting, per sq ft of hearth			Compartment 12-inch high	900	3,070	1,500				490
Range, heavy duty		36 x 36 x 36		15,000	51,100	25,600				8,200
Top section				6,000	20,400	10,200				3,200
Oven										
Range, medium duty		30 x 32 x 36		8,000	27,300	13,600				4,300
Top section				3,600	12,300	6,200				1,900
Oven										
Range, light duty		30 x 29 x 36		6,600	22,500	11,200				3,600
Top section				3,000	10,200	5,100				1,600
Oven										

Statler Hilton, Hartford, Conn. Kitchen is large enough to serve as many as 1,865 dinners at one time.

imum hourly input" to cooking appliances is 0.50. This factor is applied to the manufacturer's hourly input rating.

8. For unhooded cooking appliances, the heat gain to a room is equal to the "probable maximum hourly input." Unless otherwise known, this heat gain may be assumed to be 66% sensible heat and 34% latent heat.

9. Unhooded cooking appliances add tremendously to the cooling load and should never be so installed if there is any possible way of locating them under an exhaust hood.

Notes for Table I

1. Heat gain from cooking appliances located in the conditioned area (but not included in the table) should be estimated as follows:
   a. Obtain "probable maximum hourly input" by multiplying the manufacturer's hourly input rating by the usage factor of 0.50.
   b. If appliances are installed without an exhaust hood, the estimated latent heat gain is 34% of the "probable maximum hourly input" and the sensible heat gain is 66%.
   c. If appliances are installed under an exhaust hood, the estimated heat gain is all sensible heat and can be calculated from equations (2) and (4) in the text.
2. Heat gain from cooking appliances, not located in the conditioned area, is not considered in cooling load calculations.

PIPING AND PLUMBING

Support for Plumbing Risers

A SYSTEM of adequately sized soil, vent, cold and hot water piping is an important consideration for every new building. It is equally important that the various systems of piping be carefully supported to prevent sagging or settlement of the piping. This sagging can result in leakage or severe strain on the piping. Therefore, there must be proper support for both vertical risers and the horizontal piping. The number and spacing of the supporting devices for horizontal piping is determined on the basis of the particular piping material to be supported as well as other factors related to the size and type of the pipe. For example, supports for copper tubing must be spaced closer together than hanger supports required for galvanized steel or galvanized wrought iron pipe. This article covers methods of supporting the vertical piping risers and not horizontal piping supports except those located near the base of the plumbing risers.

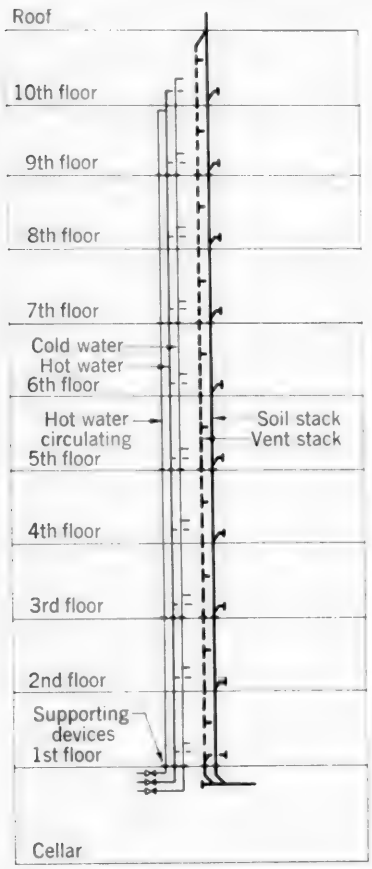


Fig. 1. Typical plumbing riser stack and the location of devices for supporting the risers.

Vertical Piping Risers

Vertical piping risers may extend upward to serve several stories or floors depending upon the height of the building. This weight to be supported may be considerable and it depends on (1) pipe diameter, (2) the particular piping material used, and (3) the weight of the fluid in the pipe. Furthermore, the pressure surge of the water flowing in the piping causes a certain movement of the piping which must be controlled by the supports.

For an example of a typical set of plumbing risers, refer to Fig. 1 which shows a 10-story building. The risers consist of a soil stack, vent stack, cold water, hot water and hot water circulation lines. These risers are normally supported every 2 or 3 floors. In this case the risers are shown supported on every second floor. Thus the risers are set at first, third, fifth, seventh and ninth floors. An engineer might not generally indicate the location of the supporting devices on his plans or riser diagram. He might cover this phase of work in more detail in his specifications. Sometimes he may just mention in his specifications that the contractor is to furnish and install proper supports at all required locations where needed. Proper piping support is a very important phase of the work and should not just be left to the responsibility of the plumbing contractor. Instead, the supports should be designated on the riser diagram and a description of the type of devices favored should be included in the specifications. Since the piping is expected to serve for many years, reliable methods of support should be provided.

Types of Supports

There are many types of supporting devices available to satisfy any specific requirement concerning the piping. Figure 2 shows just a few of the very many types of devices that can be used.

A very popular and reliable type of device is the riser clamp. This device is placed around the piping and rests on the floor slab. When the bolts are secured, a very rigid means of support is furnished.

The riser clamp with uprights is used when it is not possible to utilize a regular riser clamp at the floor slab. When this situation prevails, the riser clamp is equipped with upright rods that extend up through the floor slab and terminate at steel plates that rest on the floor slab. The riser clamp is then anchored to the piping below the slab and provides a very durable means of support.

Riser clamps can be furnished in a number of different shapes and forms to satisfy the most diversified

needs. The riser clamp with elongated legs is an example of the type of flexibility that can be accomplished with this type of device. The riser clamp can also be so fabricated that it will handle several different sized risers. This type of unit is called a combination riser clamp and is shown in one of the details with this article.

Since it is important that the horizontal piping directly near the vertical risers be given careful attention, several supporting devices that may be used have been shown in Fig. 2. The first unit is a band hanger, which is slipped around the piping. The bolt secures the band hanger to the piping and also engages the vertical upright and adapter which is extended either to a threaded anchor plate which is attached to the underside of the floor slab or to steel plates that rest on the floor slab, above. Many varieties of concrete inserts are available into which the head of the upright can be inserted to provide the proper support.

Another favorite type of support is the split hanger. This device is installed in the same manner as that described for the band hanger. The split hanger has the advantage that another hanger may be added to the bottom bolt to hold a line of piping that can be installed directly under the first line of piping.

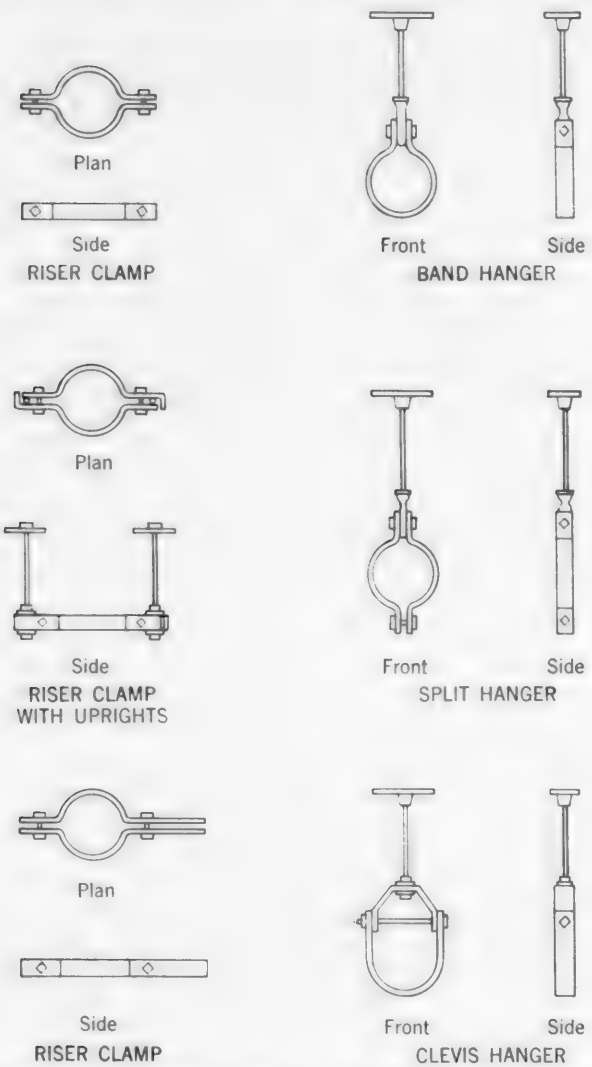
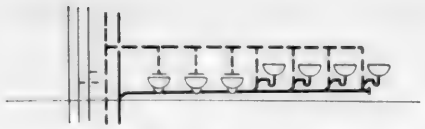


Fig. 2. Various devices that may be used to support risers and horizontal piping.



Typical roughing arrangement for fixtures that include wall mounted water closets

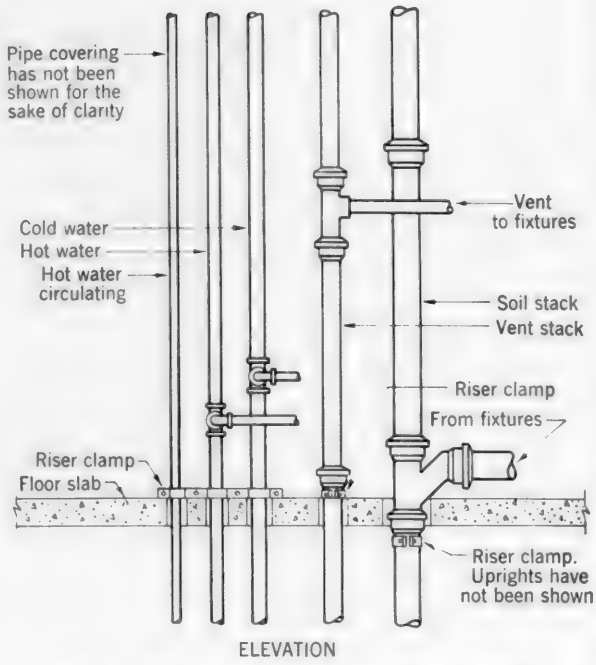


Fig. 3. Supports to carry the weight of piping.

The clevis type of hanger is quite frequently used and is installed in the same manner as the band or split hangers. The clevis hanger is of particular advantage since it facilitates the installation of horizontal piping. The lower ring is removed and the piping is held in place while the ring is replaced and secured.

When a specific need arises, the engineer should check with the manufacturer of pipe supports. It is certain that the exact devices needed for a proposed installation can be obtained. A manufacturer can suggest many helpful hints about supporting devices that will greatly simplify the design.

Wall Mounted Water Closets

In Fig. 3 is shown the manner in which supporting devices are used with a group of plumbing risers. The small scale detail represents a typical upper floor of Fig. 1, and shows an arrangement of wall hung water closets, several lavatories, and the piping risers that serve these fixtures. The waste piping from the fixtures is contained above the floor slab; therefore, the connection to the soil stack is also accomplished above the floor slab.

The enlarged elevation shows that a riser clamp with uprights, similar to the one illustrated in Fig. 2, is used to support the soil stack. The vent stack is supported by a regular riser clamp that rests on the floor slab. In each

Typical roughing arrangement for fixtures that include floor mounted water closets

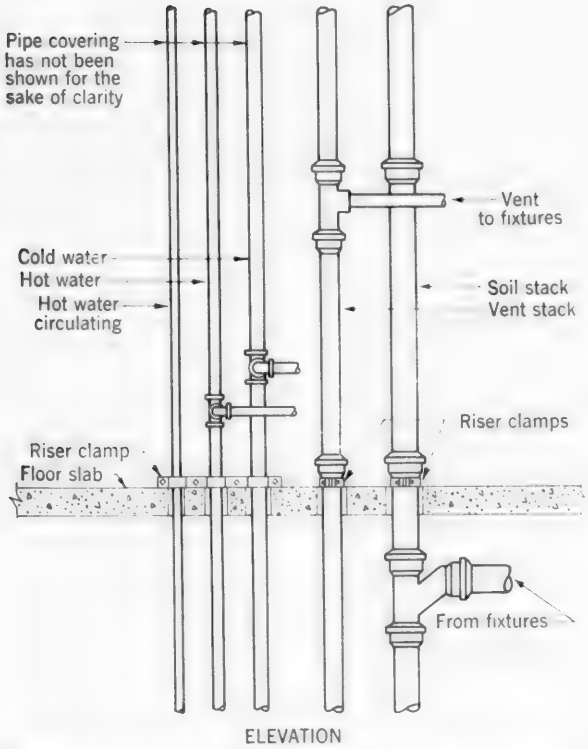


Fig. 4. Support of risers for special plumbing problem.

case the riser clamp is attached to the pipe just below its hub. This practice affords a positive attachment. Cast iron soil pipe has been detailed in this instance to point out the importance of adequately supporting this type of piping. If cast iron pipe is not carefully supported for its entire length, sections of the pipe can pull loose so that leaks result. If galvanized steel or wrought iron pipe are used, the supports would be placed in the same locations. The same applies to copper drainage piping.

Riser clamps are also used for the water piping. Individual riser clamps can be used for each water riser or a combination unit similar to that shown may be employed. The combination unit can be furnished by the manufacturer, upon request. It is only necessary to supply data regarding pipe diameter and the desired spacing between the water risers. As mentioned previously, numerous devices are available to satisfy any construction need.

Floor Mounted Water Closets

Where floor mounted water closets are concerned, the installation would be similar to that shown in Fig. 4.

Here the fixtures consist of several floor mounted water closets and several lavatories. The small scale diagram shows that the waste piping from the fixures is installed under floor slab. This requires that the connection to the soil stack be accomplished under the floor slab.

Referring to the enlarged elevation, note that the soil stack is supported by means of a riser clamp resting on the floor slab. The vent stack is supported in the same manner. The horizontal waste line from the fixtures should also be supported from the floor slab by either of the three vertical hangers offered in Fig. 2.

The water risers are supported by a combination riser clamp of the type which includes uprights as described in Fig. 3.

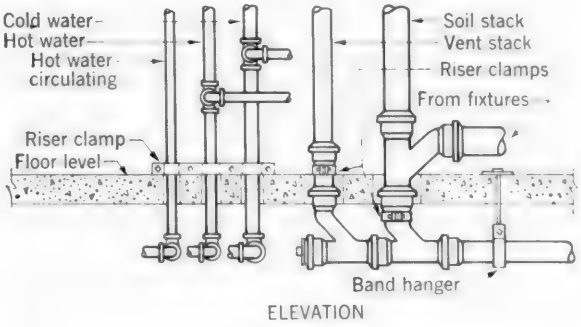
Base of Risers

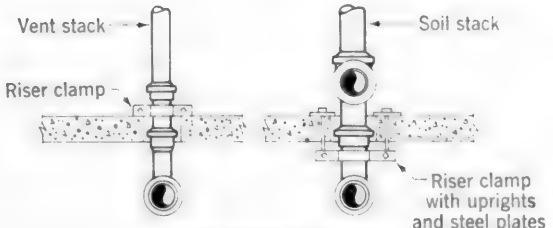
Careful attention must be given the supporting devices at the base of the plumbing risers. For wall mounted closet installations, the supports would be similar to that shown in Fig. 5.

The small scale diagram depicts the fixtures at the first floor level in the building. Once again, note that the waste line from the fixtures is run above the floor slab and rests on concrete cradles provided for this purpose.

The enlarged elevation indicates that a riser clamp with uprights is utilized for the support of the soil stack. The vent stack is supported by means of a regular riser clamp. The horizontal piping below the floor slab must be firmly supported to anchor this piping securely in

Typical roughing arrangement for fixtures that include wall mounted water closets at lowest floor level in building





Side view of the soil and vent stack showing how the riser clamps are used

Fig. 5. How different risers are supported at the lowest floor level.

place. The separate detail of the soil and vent stacks portrays the manner in which the riser clamps are used. The riser clamp and steel plates span the penetration or slot provided in the floor slab for the passage of the piping.

The water risers are supported by a combination riser clamp. The horizontal water lines will be supported by means of either a trapeze hanger or individual hangers of the type suggested in Fig. 2. Neither of these supporting means have been included in the detail.

Floor mounted water closets at the base of the riser will have its component piping supported by the method given in Fig. 6.

The small scale diagram indicates that the waste piping from the fixtures is run under the floor slab and connects with the building drain.

The enlarged elevation shows that riser clamps are used to support the soil and vent stacks. In addition, band hangers are carefully applied under the floor slab to support the horizontal piping and to prevent the fitting from pulling out of the risers.

A combination riser clamp has been used to support the water risers. The horizontal water lines are supported by either a trapeze hanger or individual pipe hangers.

Typical roughing arrangement for fixtures that include floor mounted water closets at lowest floor level in building

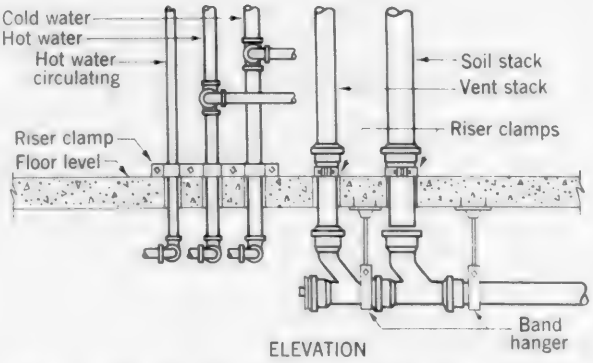


Fig. 6. How risers are supported at the lowest floor level with a different plumbing fixture installation.

Pipe Spaces

Many different pipe spaces are used for the installation of piping risers. Some include penetrations just large enough to permit the passage of the risers. Others involve slots for the passage of the piping, while still others are completely open pipe spaces. When these conditions are encountered, special care must be exercised to ensure that the proper types of supports will be provided.

Often, these conditions will require special supports and frequently, additional steel framing to which the supports can be attached. Regardless of the complicated nature of the construction, there are supporting devices available for each need. It is necessary only to check with the favored manufacturer to obtain recommendations for the correct device.

It is as important to have proper support of piping as it is to have an adequately sized piping system. Therefore it is recommended that every exact support location should be denoted on plans or riser diagrams. It is preferable to locate the devices on the riser diagram since this particular drawing represents an elevation of the entire piping system. The specific types of devices should also be spelled out in the specifications. This removes a responsibility from the plumbing contractor and ensures both a well designed and installed piping system.

Thermal Insulating Materials

A new specification and two new methods of test were accepted by ASTM Committee C-16 on Thermal Insulating Materials at its meeting held on February 4 during ASTM Committee Week in Pittsburgh. These are: Specification for Mineral Wool Hydraulic-Setting Thermal Insulating Cement; Method of Test for Breaking Strength and Calculated Modulus of Rupture of Preformed Thermal Insulation for Pipes; and Method of Test for Density of Fibrous Loose Fill Building Insulations. They will be submitted to the Society for adoption at the annual meeting in June.

The committee revised the following: Specification for Diatomaceous Earth Block-Type Thermal Insulation (C 333T); Specification for Diatomaceous Earth Thermal Insulation for Pipes (C 334T); Method of Test for Mechanical Stability of Preformed Thermal Insulation by Tumbling (C 421T); Method of Test for Mean Specific Heat of Thermal Insulation (C 351T); and Method of Test for Water Vapor Transmission of Materials used in Building Construction (C 335T).

The wide range of materials covered by Committee C-16 is further indicated by current projects such as the preparation of a specification for roof decked slabs, the measurement of sag tests in insulating formboard, the study of underground thermal insulations, a final draft of the method for measuring maximum use temperature, round robin tests on the adhesive strength of coatings, and the selection of a research project on the permeance of various types of insulating materials.

Reflective insulation is one of the newer types of materials within the scope of the committee. Its physical properties are now being studied so that suitable test methods may be developed. The properties needed in nuclear applications are also being investigated. Methods for determining the trueness and squareness of pipe covering and block type insulation are on the program of the subcommittee concerned with general standards. This group is also concerned with certain recommended practices, one being for prefabrication or field fabrication of thermal insulation fitting covers, and another for cutting beveled blocks of preformed thermal insulation. The first mentioned practice has already been approved by the committee; the second is now to be circulated for letter ballot.

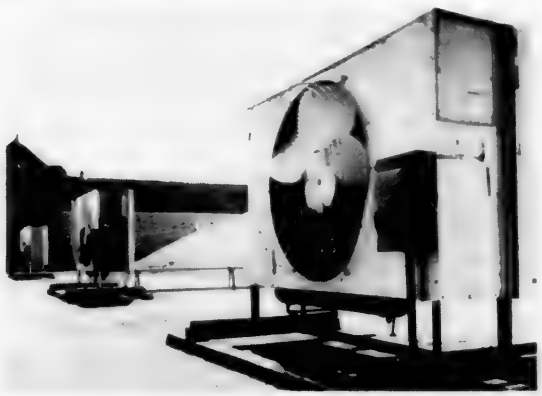
PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Alleys' Air-Cooled Air Conditioning Bowls Over Installation Costs

At West Chicago, Ill., the 24-lane Bowling Green bowling alleys, which also includes a bar and lounge, has had another addition—an air conditioning system.

The highside of the system was recently installed using 3 Dunham-Bush "LRCU" large remote condensing units, each of which consists of a remote air cooled condenser,



a receiver, magnetic starter, a Brunner semi-hermetic compressor, and controls and refrigeration accessories all piped and wired in the same casing. The lowside equipment, 3 Dunham-Bush "HAH" horizontal air handling units, was placed in the superstructure, directly below the remote condensing units, thus slashing costs by minimizing the length of refrigeration piping, electrical connections, and installation space required.

Owners of the bowling alleys contacted Bremer Steel Metal Co., Ellyn Glen, Ill., to install the system.

Toll-Booth Plaza Kept Snow-Free By Hot Oil in Welded Piping

A hot-oil snow melting system is averting traffic jams at toll booths during the first winter's operation of Chicago's new $101-million Calumet Skyway bridge. Concealed beneath the concrete, a serpentine-grid network of welded carbon steel piping circulates 1100 gpm of heated light oil to warm the roadway to 34-36 deg F and keep the 22-lane toll plaza area free of ice and snow. The system, first of its kind on a Chicago highway, covers an area of more than 58,000 sq ft, giving cars from 120 to 160 ft of bare surface for slowing down and 40 ft in which to pick up speed again.

City officials say that with the combined use of welded piping and non-corrosive oil as the heat-exchange agent, the snow melting system should easily outlast the tollway itself without signs of deterioration. Numerous changes of direction and connections in the buried coils of pipe, as well as in the pipes leading from boilers to pumps to the road area, are made with welding fittings manufactured in Louisville, Ky., by Tube Turns Division of Chemetron Corp.

The oil used in the snow melting system is heated in heat exchangers to a maximum of 160 deg by steam from two 200-hp boilers located under the toll plaza. It is circulated to the road area through all-welded piping that starts at 8 inches and is reduced to 5, 4, 3, 2, 1¼ and finally ¾ inches. The snow removal system was designed by Consoer, Townsend & Associates, Chicago, and the piping contractor was Chicago Conditionaire Co.

Sun Control Cuts Air Conditioning Requirements For Curtain-Walled Texaco Building

Inside and out, the new Texaco building in Los Angeles is an outstanding example of modern curtain wall construction. The 12-story building serves as the company's west coast executive offices, and is headquarters for the executive, sales, refining, legal, producing and other departments serving eight western states. Keeping the 800 or more occupants of the building comfortable is a double-duct, high velocity air conditioning system equipped with thermostatic zone control.

The building itself takes advantage of the striking visual effects possible through extensive use of glass areas. Approximately 30,000 sq ft of a new product, Glare-X, was installed on the exterior walls facing east, west, and south. Glare-X consists of two layers of clear glass hermetically sealed together with a sheet of Kool-Shade sunscreen between them.

KoolShade, manufactured by Reflectal Corp., Chicago, Ill., is a venetian blind, the horizontals of which are tiny metal fixed louvers, .05 inches wide and .005 inches thick. These are permanently set at a 17-deg angle, determined to be optimum for reflecting a maximum of solar energy at all hours of the day throughout the year. These louvers, or slats, block heat-producing solar energy as well as glare. Thus, window walls do not impose a heavy burden on the refrigeration equipment; only 650 tons of refrigerating equipment was required to condition the 170,200 sq ft interior space. Without "solar conditioning" of window areas, considerable additional air conditioning equipment would have been required.

NEWS OF THE MONTH

FRICTION FACTOR

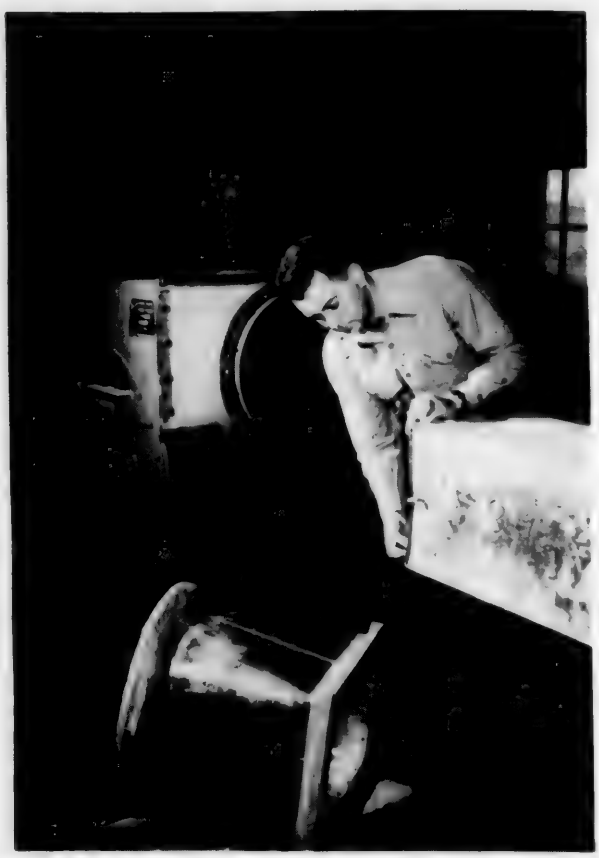
sought for noncircular ducts at Texas Engineering Experiment Station in graduate research program.

An experimental investigation of the friction factor in noncircular ducts is under way at the Texas Engineering Experiment Station, College Station, Tex.

While a great amount of data has been accumulated during the last few years, and used to prepare curves and equations for fluid flow in pipes, and round ducts, very little has been accomplished pertaining to noncircular ducts, according to John C. Tyler, graduate research assistant at the Station. (Mr. Tyler is shown in photo assembling set-up for a test run.)

• **FURTHER STUDY NEEDED**—In August 1957, the Texas Engineering Experiment Station ran a test on an Owens-Corning flexible duct liner to determine the quantity of air erosion, the Darcy friction factor and absolute roughness for a specified duct arrangement. The test section of the duct was square.

After the data taken during the test were used to make the calculations, it was observed that the calculated values of absolute roughness did not agree at various velocities.



Square duct set-up to determine friction factor.

All computations were checked thoroughly and the accuracy at all velocities was approximately the same.

The only possible explanation at the present time, says Mr. Tyler, may lie in the fact that the Colebrook function relating friction factor, roughness, and Reynolds number was derived for a round duct. In applying this function to a square duct, the hydraulic diameter was used instead of the duct diameter, which is supposedly a valid substitution.

Further investigation of the flow of fluids in noncircular ducts may present the applicability of the Colebrook function and also give a supply of valuable information that pertains to this subject.

The graduate research described in this writing is being supervised by Donald M. Vestal, Jr., head, Heat Power Research Group, Texas Engineering Experiment Station.

UNITED ENGINEERING TRUSTEES

name Turner Construction Company general contractor for 18-story Engineering Center near UN.

Turner Construction Co., New York, N.Y., was named general contractor for the United Engineering Center. This new headquarters of the nation's leading engineering societies will be erected on the west side of United Nations Plaza between 47th and 48th Streets in New York City. The announcement was made by Andrew Fletcher, president of United Engineering Trustees, Inc., and president of St. Joseph Lead Company of New York.

The Center, a $10,000,000 tower structure of 18 stories, with about 260,000 sq ft of floor space, will house ten national engineering societies who together represent nearly 250,000 members in major fields of creative engineering. Engineering Societies Library, the nation's most comprehensive repository of vital technical information, will also be housed in the Center, as will five joint groups dealing with engineering research and improved educational standards.

• **EXHIBITS**—Space has been set aside in the building for educational exhibits which will dramatize the creative role of engineers in advancing world living standards. The metal, glass and limestone structure, fully air-conditioned, will occupy a site of 37,000 sq ft.

As announced previously, architects for the Center are Shreve, Lamb and Harmon Associates; the structural engineers are Seelye, Stevenson, Value and Knecht; and the mechanical engineers are Jaros, Baum and Bolles.

United Engineering Trustees, Inc., is an organization set up by participating engineering societies to perform management functions in their joint behalf, and is in charge of the planning and operation of the Center. UET now operates the 50-year-old engineering headquarters at 29 West 39th Street, New York, which now houses many of the societies which will occupy the United Engineering Center.

Willis F. Thompson, vice president of Westcott and Mapes, consulting engineers of New Haven, Connecticut, is chairman of the real estate committee of UET, which will have general supervision of design and construction of the new building.

• **SOCIETIES TO MOVE**—Engineering groups which will be housed in the new Center include: American Institute of Chemical Engineers; American Institute of Consulting Engineers; American Institute of Electrical Engineers; American Institute of Industrial Engineers; American Institute of Mining, Metallurgical and Petroleum Engineers; American Society of Civil Engineers; American Society of Heating, Refrigerating and Air Conditioning Engineers; The American Society of Mechanical Engineers; American Welding Society and the Society of Women Engineers.

Joint bodies which have indicated a desire for space in the Center are: Engineering Foundation; Engineering Index; Engineers' Council for Professional Development; Engineers Joint Council; and the Welding Research Council.

ELECTRIC HEATING PROGRAM

urged on electric utilities by manufacturer. Lowered rates for heating and adequate installations stressed.

A call to build electric space heating as the foundation of the electrical industry was directed by M. R. Van Zanten in his keynote address to the Southwestern Public Service Company annual sales meeting, January 8, in Amarillo, Texas.

Mr. Van Zanten, who is advertising director with the Swan manufacturing company, suggested that the electrical utilities, by concentrating on selling only 60 watts of lighting, are walking away from a potential sale of 1500 watts of heat for the same space. "Lack of enthusiasm" on the part of many utilities to promote electric heat, was cited. He called for an awareness by utility people of the tremendous potential in the field. For example, he said, "according to NEMA figures I have computed, there were over $10,000,000 worth of electric heaters for permanent installations sold at the manufacturers' price level in 1958."

The Southwest utility has a sufficiently favorable rate structure to go after any job now heated by gas, oil, coal, or wood, he said. Promotion should stress safety, cleanliness and comfort. The public will pay more for electric heat if it is necessary.

Among other factors which should be taken into consideration when selling electric heat, according to Van Zanten, are potential customers should not be driven away by telling them their homes have to be built like a vault before they can heat with electricity. Heat loss is the same for oil and gas heating systems as it is for electricity; Enough heat should be installed for permanent efficiency; Eighty per cent of all the heating in the area of the Southwest Public Service Company can be electric; Heating rates should be lowered, where possible, and if necessary, the general-use rate should be raised.

HEAT PUMP

serves new 220,000-sq ft Flick-Reedy installation. Conventional system would use 50% more space.

An unusual heat pump installation, providing heating for a new plant of 220,000 sq ft, and 640 tons of refrigeration for summer cooling, was installed in the new plant of The Flick-Reedy Corp., Bensonville, Ill. The installation which covers a floor area of 50 x 50 ft consists of three separate York systems. A conventional heating system with two boilers and air conditioning equipment would require 50% more floor space. Over 1,200 hp in electric motors is used to drive pumps, compressors and fans.

Heat pumps installed at the new Flick-Reedy plant. At left, Frank Flick, president, Flick-Reedy Corp.; at right, Roy C. Ingersoll, chairman of Borg-Warner Corp., Chicago, Ill.

Each heat pump circuit has two compressors installed in parallel, and a third unit which kicks in during the heating cycle, when the outside air temperature drops. Although single stage operation is sufficient for summer cooling, two stages are necessary with outside design air conditions of —10 deg F for heating. An automatic defrost system is used when ice builds up on the outside coils.

NEW ASTM DIVISION

will develop knowledge of fundamentals, providing meeting ground for the scientist and engineer.

A new Division on Materials Sciences will be organized by the American Society for Testing Materials, Philadelphia, Pa., to coordinate and intensify the development of knowledge of the fundamentals of materials. The new division, the first to be established by ASTM, will augment in depth and scope the Society's objectives of promoting knowledge of engineering materials and tapping

new sources of knowledge for the Society's extensive standardization activities. The division will concern itself with collection, establishment, and publication of basic information essential in creating a better understanding of materials and their properties, and especially will help to answer "why" materials are what they are.

Since its inception in 1898, the Society has published hundreds of technical papers and outstanding symposiums dealing with problems which are fundamental to our knowledge of why materials act the way they do. For example, a publication just being issued, *The Mechanism of Fatigue*, deals almost entirely with the fundamentals of this phenomenon. The extensive nation-wide studies of corrosion-resisting properties of materials, on effect of temperature on metals, and many activities carried on in technical committees concerned with petroleum products, cement, soils, electrical contacts, and a host of other materials, contribute to fundamental knowledge. The studies also reveal areas where more basic information is needed.

The great need for intensifying our basic knowledge of materials strongly justifies providing a special place in the Society for concentrating in this area and for bringing together scientists and specialists from different fields, the Society believes.

Actual development of the division has been entrusted to a group of four officers—President K. B. Woods, Head, School of Civil Engineering, Purdue University; two ASTM vice-presidents: F. L. LaQue, vice-president and manager, Development and Research Division, The International Nickel Co., Inc., and A. Alan Bates, vice-president of research and development, Portland Cement Association; and Executive Secretary Robert J. Painter.

AMERICA IS HOST

to 13th International Congress on Occupational Health for the first time; 1960 papers are invited.

The 13th International Congress on Occupational Health—first to be held in the Western Hemisphere—will meet in New York City, July 25 to 29, 1960, according to an announcement by Dr. Leo Wade, of New York, who is chairman of the Organizing Committee. Several thousand physicians, nurses, industrial hygienists and other delegates from more than forty countries will attend, Dr. Wade said. He is medical director for Esso Standard Oil Company.

Theme of the meeting will be prevention, rather than cure. Program participants from the many countries will report on their experiences, the findings of both clinical and laboratory research, and on methods for control of occupational health hazards. Plans already are underway to provide meeting facilities, and for translation services, accommodations for the visitors, and other arrangements.

The congresses are sponsored by the Permanent Committee and International Association on Occupational Health, of which Dr. Sven Forssman, of Stockholm, is president and Dr. Enrico Vigliana, of Milan, is secretary.

All previous meetings have been held in Europe, beginning with the first one in Milan in 1906. The 12th Congress was in Helsinki in 1957.

• **INVITATION TO SUBMIT PAPERS**—The Scientific Program Committee invites submission of papers for presentation at the Congress. The Program will be devoted to the following aspects of occupational health:

Administrative practices, medical practices, surgical practices, education and training, social and legal aspects, environmental hygiene, influence of environmental factors in health, work physiology and psychology, specific industries, general.

Official languages of the Congress will be English, French, German, and Spanish. However, papers may be read at the Congress in the language desired by the author. Those desiring to present papers must submit abstracts before January 1, 1960 to Dr. Irving R. Tabershaw, chairman of the Scientific Program Committee, International Congress on Occupational Health, 375 Park Avenue, New York, N. Y.

The Unitary Air-Conditioner Section of Air-Conditioning and Refrigeration Institute met in Washington last month to hear enthusiastic reports of the success to date of its Unitary Certification Program and to plan further steps in the program, in which more than forty manufacturers are signed up. Pictured at the session are:

Standing, left to right: M. B. Watts, Frick Company; John A. Gilbreath, Typhoon Air Conditioning Company; J. W. Hosler, American-Standard Industrial Division; D. H. Crawford, York Corporation; D. E. Fox, York Corporation; R. L. Sherrill, Jr., Westinghouse Electric Corporation; T. H. Ford, Fedders Corporation; H. H. Ward, Frigidaire Div., General Motors Corporation; Sydney Anderson, Jr., Airtemp Div., Chrysler Corporation; and Frank E. Purcell and A. E. Meling, both of Carrier Corporation.

Seated, left to right: T. I. Harriman, American-Standard; Lee Wilcox; Janitrol Heating & Air-Conditioning Div., Surface Combustion Corporation; Edward L. Davis, Rheem Manufacturing Company; Frederick J. Reed, chief engineer, ARI; Miss Mary Jane Stewart, Assistant Director, ARI; Coit Lytton, chairman of the Section; Geo. S. Jones, Jr., managing director, ARI; A. F. Ward, Worthington Corporation; F. H. Faust, General Electric Company; Burl C. Brown, National-U.S. Radiator Corporation, and Paul W. Wyckoff, Airtemp Div., Chrysler Corporation.

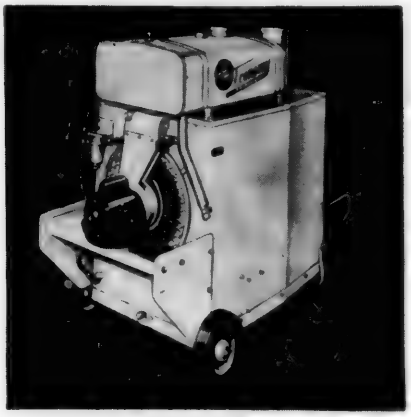
(News of the Month continued on page 152)

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on the last page for securing additional information about new equipment and materials described in this department.

Portable Air Heaters

Demand for a moderate priced portable heater has persuaded American Air Filter Co., Louisville, Ky., to reinstate the Economy model to its 1959 line of Herman Nelson portable air heaters. Heater is particularly suitable for use by contractors, builders, and industrial firms.



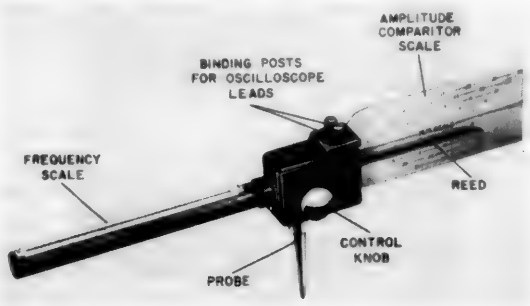
Unit has been re-engineered for intermediate capacity and to provide approximately 40% greater heat capacity, up to 270,000 Btu per hr. It operates on either gasoline or fuel oil—with no adjustments necessary.

Its new burner is said to assure longer, trouble-free, clean heat and more usable heat per gallon of fuel. Canvas ducts direct the heat to the proper working areas. Combustion fumes are vented away. Simplicity of control and quietness of operation are also listed among improvements to the new unit.

More information? Circle Item 1, postcard, last page.

Reed Vibrometer

A light, compact, hand-held, reed vibrometer of high accuracy and with many uses is announced by The Korfund Co., Inc., Long Island City, N. Y.



The vibrometer will do the following: (a) measure vibration frequency and amplitude; (b) determine the direction of maximum transmitted disturbances; (c) locate the cause of unwanted noise due to resonant vibration; and (d) measure the speeds of rotating equipment where shafts or rotors are not readily accessible, by placing the probe against the machine housing. In addition, it can be used to analyze component frequencies of complex vibrations.

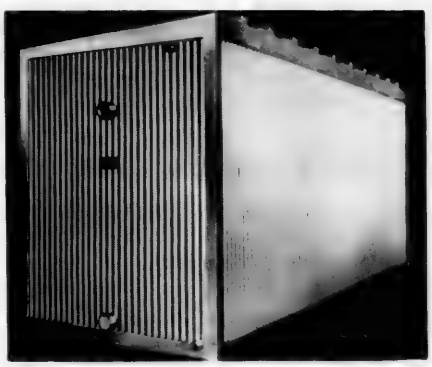
Output of the instrument's built-in electromagnetic pickup can be attached to an oscilloscope or oscillograph to display or permanently record. Frequency range is 120 to 15,000 cpm. Instrument weighs one pound, and is sold with carrying case and instructions.

More information? Circle Item 2, postcard, last page.

Ice Builders for Cooling

A line of air-agitated ice builders for peak-load cooling is announced by The Vilter Mfg. Co., Milwaukee, Wis. The line includes models from 1850 to 77,000 lb capacity in 31 models. Units are said to be especially suitable for dairies, churches, meeting halls, breweries, and chemical plants, where peak loads are constantly encountered.

Units from 1850 to 11,400 lb capacity employ Refrigerants 12 and 22 for direct-expansion operation. Units from 2,000 to 77,000 are available for flooded, ammonia operation.



All the builders are equipped with a small, low-horsepower, positive displacement, V-belt driven blower which provides the air needed to agitate the water in the tank. Investigation has shown, the Company states, that during the ice build-up period, this method of circulation tends to produce a clear, even formation of ice on the coils. During the cooling cycle, air agitated circulation effects an even melting of ice over the entire coil, thus maintaining an almost constant 33-34-deg F outgoing water.

Models up to and including a capacity of 10,200 lb have 7½ by 7½ inch coil centers. On the larger models, the vertical coil is 7 inches, the horizontal coil 7½ inches. About 13 lb ice per ft of pipe is frozen.

The galvanized steel tank, made to conform to U. S. Health Department requirements, is available with or without insulation.

More information? Circle Item 3, postcard, last page.

Copper-Covered Tie Wire

Pre-packaged copper-covered steel wire has been introduced for use with tie-wire reels, for fastening pipe insulation where salt spray and other corrosives prevail, according to National-Standard Co., Niles, Mich.

The wire, known as Copperply, is 16 gauge with 15% copper by weight. This provides a 1¾-mil protective copper coating around the steel core.

Made by continuously electroplating copper concentrically around a steel core wire, Copperply is pre-packaged by the manufacturer in 4-lb coils for sale by Ideal Reel Co., Paducah, Ky., with its Ideal tie-wire reel.

Tie wire used in conjunction with the reel is reported to permit up to 25% more times per manhour than by pulling wire from a loose coil. Safety is improved because loose wire ends and kinks are eliminated; wire consumption is cut by an average of 20% because waste is eliminated. Note reel mounted on man's belt in photo.

More information? Circle Item 4, postcard, last page.

Outdoor Temperature Control

Weather-Meter, a system of zone temperature regulation offered by National Controls, Inc., Newton, Mass., makes proper provision for solar changes and wind variation, in addition to sensible temperature changes. The result, the company states, is a completely automatic system that requires no compensation for any variables.

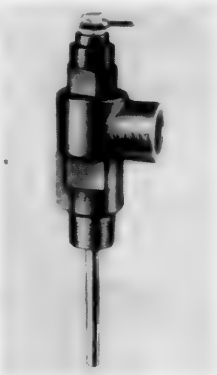
The system is, basically, as follows: A small insulated metal house mounted on the roof of the building simulates the heat loss from the building, compensates for wind variation, solar radiation, rate of temperature rise, and the speed of the heating medium used. A thermostat in the roof unit sends this information to a remote selector cabinet that contains adjustment controls that permit regulation of desired internal temperatures in the various zones.

The control center takes its commands from the thermostat in the roof unit and controls zone temperatures through electric motor-operated, two-position valves. These are available for all types of steam and hot water heating systems in all standard pipe sizes. They may be hand operated in the event of power failure. One system serves four zones. Large buildings may require two or more systems.

More information? Circle Item 5, postcard, last page.

New Design in Relief Valve

Beaton & Cadwell Manufacturing Co., New Britain, Conn., announces a new approach in relief valve design with No. 88 temperature and pressure relief valve. The ¾ x ¾-inch valve provides a capacity formerly not even available on valves with 1¼-inch inlet, costing up to three times as much, according to the company.



A constant load of only 3 psi is maintained on the disc regardless of pressure variation in the system. Light closing pressure permits thermal member (piston type) to push valve wide open easily, quickly relieving excessive heat.

An advantage of this design is maintenance without tools. The thermostat element can be removed from the valve for inspection or replacement simply by unscrewing the cap on top of the valve. No tools are required, and the temperature setting is not altered.

More information? Circle Item 6, postcard, last page.

Switch Eliminates Hysteresis

Faster and more reliable remote control of pneumatically-operated industrial processes is said to be possible with a new positioning switch that eliminates lags between the switch and the actuator mechanism. Introduced by The Powers Regulator Co., Skokie, Ill., switch is 20% smaller than earlier models, allowing more compact flush or surface mounting on panel boards.

Switch is used primarily for remote control of pneumatic valves or damper motors. Turning the switch knob gradually increases or decreases the flow of compressed air to these devices, opening or closing them to the desired position. Hysteresis, or the lag between a switch position change and the corresponding air pressure change, is eliminated by using a responsive ball valve instead of a needle valve in the switch.

More information? Circle Item 7, postcard, last page.

Turbo-Pressure Blowers

A series of rugged turbo-pressure blowers, designed for the quietest possible operation, is introduced by Chicago Blower Corp., Franklin Park, Ill.

The units feature alloy aluminum wheels for strength

and toughness, while at the same time the light weight increases bearing life through reduced friction. The housing of the units may be moved to any position to provide virtually universal discharge adjustment. Capable of providing constant pressure with varying air volumes, the blowers also show a highly efficient power consumption curve. At 20 kw the units will provide more than 2000 cfm of air.

Blowers are available in sizes ranging from ⅓ to 50 hp, capable of delivering from 125 to 5250 cfm of air at pressures ranging from 4 to 28 oz per sq in.

More information? Circle Item 8, postcard, last page.

Adds Lo-Boys To Furnace Line

Addition of a series of Lo-Boy Winter Weathermakers to its residential line of furnaces, with easy adaptibility to summer cooling, and with ceramic-coated heat exchangers, is announced by Carrier Corp., Syracuse, N. Y.

Company's Stratosteel heat exchanger used in the new models is coated with a combination metal and ceramic material to withstand high temperature. This is the

same Alcermet coating which protects jet engine parts from high heat and direct flame, the company states.

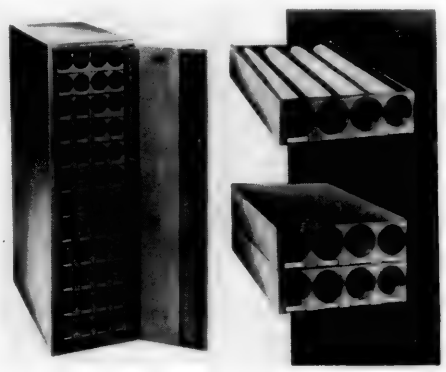
Units are designed for basement or utility room installation where headroom is at a premium. Like upflow and downflow Weathermakers, a matching cooling coil and refrigeration section can be added at any time for summer air conditioning. Temperature is maintained by the company's Control Center, which regulates cooling or heating at the flick of a switch.

The series includes six sizes with inputs ranging from 75,000 to 200,000 Btu. All are equipped with proper blower and motor selection for both heating and summer cooling. They will be available for all gases—natural, mixed, manufactured or LP.

More information? Circle Item 9, postcard, last page.

Roll Filing System

A tube-type filing system for rolled prints, charts, drawings, maps, tracings, etc., is announced by Plan Hold Corp. South Gate, Calif. Called Plan Hold Roll File, it consists of modular steel-encased Duro tubes in units of four tubes per file, as shown at upper right in photo. Units measure 12 inches wide by 4 inches high, and are currently offered in two tube lengths, 27 inches and 33 inches.



Special stacking feature enables units to be assembled for desk top mounting or under-surface table mounting by means of a slide-on top, shown at lower right, which is provided with mounting holes for suspension. A steel filing cabinet with cylinder lock in handle is also available. This cabinet, shown at left, will accommodate a total of 12 Roll File units (48 individual tubes). Fabric identification labels, which may be written on with pen, pencil, ball point, or typewriter, are available for direct labeling under each tube.

More information? Circle Item 10, postcard, last page.

Indicating Circuit Breaker

Spencer Div., Metals & Controls Corp., Attleboro, Mass., states that the simple, fundamental design of its new Klixon circuit breaker, Model 8150, improves reliability and eliminates use of several springs and adjusting pins which are prone to disorder. With ratings at intervals from 5 to 25 amps, it is designed primarily for remote, overcurrent protection of 110-volt a-c motors through ½ hp. Details in Bulletin CIRB-24.

More information? Circle Item 11, postcard, last page.

Vinyl Coated Steel Sheet

Plastics and steel sheet have been successfully combined to create a widely versatile product with applications ranging from railroad car and living room fixtures to desk accessories and picnic coolers, United States Steel Corp., Pittsburgh, Pa., announced.

Known as vinyl coated steel sheet, the new material is said to have rugged physical qualities and attractive surface treatment. It has received favorable rating from Underwriters Laboratories, Inc.

According to the steel company, its researchers successfully boiled, bent, scratched, stain tested and otherwise tortured samples of the plastic coated steel to limits far beyond those of likely product subjection. Test results, the company states, leave no doubt that the company's method of bonding and curing liquid vinyl plastisols to steel provides an enduring union.

A number of commercial products already are being manufactured with vinyl coated steel. These include portable electric heaters, room coolers, movable steel wall partitions, folding chairs, office tape dispensers, and doors. (See illustration).

Vinyl-steel gives a product the toughness and structural durability of steel plus the appearance and feel of linen, leather or any texture the designer wants. Sheets are, generally speaking, more than competitive pricewise with any similar product now on the market, the company asserts.

The plastic on steel application involves curing and bonding of liquid vinyl plastisols to sheets and coils—either cold rolled or galvanized in a continuous coating process. Prior to cooling, the coating can be embossed with any texture that is capable of being engraved on a printing roller.

Now available in many surface textures, vinyl coated steel can be produced in any specific color with assurance of color uniformity. Products made of vinyl-steel are fabricated without damage to the coating on existing customer equipment in essentially the same manner as cold rolled sheet. It retains complete bond and surface texture even after drawing or forming operations. Sheets are available in 18 through 28 gages and in widths from 24 to 52 inches. Lengths can run 30 to 144 inches. The vinyl-steel also is available in coils.

More information? Circle Item 12, postcard, last page.

Shower Stall to Steam, Sun Room

An equipment package that transforms the conventional shower stall or bathtub into a unique steam and sun room, for the home, apartment, hotel, motel, or office, is announced by the manufacturer, Thermasol Limited, New York, N. Y.

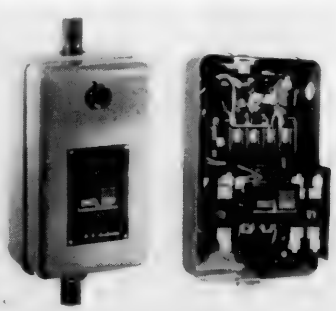
Called the Thermasol Home Steam and Sun Room, it comes in five standard models. The unit includes a compact electric boiler for generating the steam, a metal self-enclosed unit with attached sun lamp, air blower, ceiling light and control switches, a vapor-proof enclosure, and a wall-hung metal seat and chains.

The enclosure, with sliding glass panels for the bathtub and sliding or hinged doors for the stall, becomes a self-contained unit with all electrical and plumbing connections isolated in the sealed-off ceiling area. The unit is available in 110 and 220 volts, provides 70 to 160 deg "steam", and is offered in polished aluminum and white baked enamel finish.

More information? Circle Item 13, postcard, last page.

Line of Motor Controls

A new line of motor controls is announced by Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Simplicity of Size 0 to 4 controller line is based on building block modifications, kits. A full range of standard, special-design, and accessory control devices is available in



these sizes for applications from 110 to 600 volts for fractional to 200-hp motors.

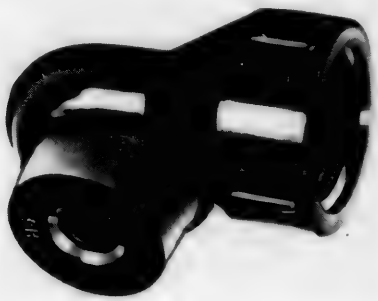
Photo shows several modification kits in place, including, at bottom right, third overload relay; at center, start-stop pushbutton; at left side of epoxy magnet coil, auxiliary interlock; and above magnet coil, pilot light.

Most of the modification kit components are one size for all sizes of controllers, leading to considerable savings in spare parts inventory.

More information? Circle Item 14, postcard, last page.

Plastic Spray Nozzle

Hydro-Spray hollow cone spray nozzles are announced by Austin Mfg. Co., Austin, Tex. Injection molded from Tenite, a butyrate well suited for resistance to corrosion, electrolytic action, and friction, the nozzles are said to offer increased capacity and efficiency at low cost. It is next to impossible for impurity deposits to build up on the active surfaces of the nozzle the company states.

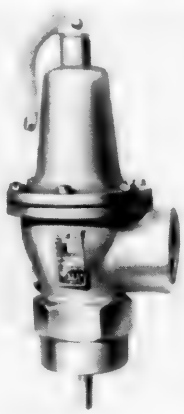


Applications envisaged include cooling towers, spray ponds, air washers, scrubbers, aerators etc. A swirl-in entrance combined with a whirling chamber permits maximum break-up of spray. This, according to the manufacturer, combined with low energy loss from friction or fluid turbulence, allows greater volume from existing piping and pumping systems. When applied to operating equipment, the result is said to be lower operating temperatures and lower head pressures. An efficient spray is possible at pressures below ½ psi.

More information? Circle Item 15, postcard, last page.

Large-Capacity T&P Relief Valve

A large-capacity, ASME-rated, combination temperature and pressure relief valve, the No. 340, is announced by Watts Regulator Co., Lawrence, Mass.



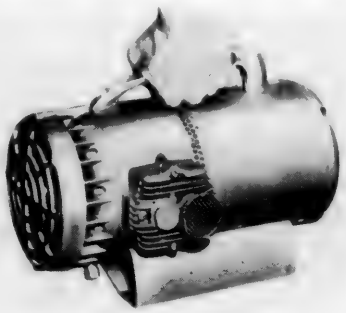
Valve is equipped with a test lever and has 1½-inch female inlet and outlet connections. Features include all bronze construction; guideless, stickage-free seating design; and extremely high capacity. Its ASME steam pressure rating is 5,707,000 Btu per hr at 125 lb, and the temperature water rating is 3,500,000.

Said to be the only valve of its type available, it can be installed on larger installations which previously required two or more smaller valves for sufficient capacity, the company states. A complete range of ASME-rated, self-closing temperature and pressure relief valves in sizes ¾ through 1½ inches, with corresponding high ratings, is now available.

More information? Circle Item 16, postcard, last page.

Air-Sampling Vacuum Pumps

An air-sampling vacuum pump is announced by Gelman Instrument Co., Chelsea, Mich. The portable low-cost unit has been designed as a powerful, continuous-duty vacuum source for use in plant safety and air pollution studies. It is activated by graphite-ringed pistons which give volumetric flow over a wide range of vacuum conditions.

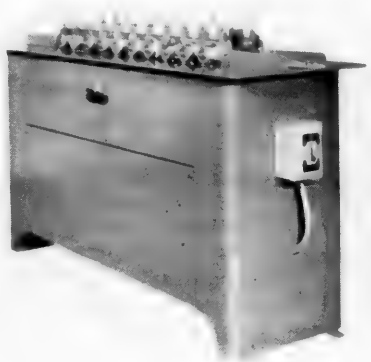


Choice of air capacity is 2 or 4 cfm. Inlet and exhaust valves are optically polished to give a leakproof fit. All bearings are grease packed and sealed. Piston ring joints are self sealing.

More information? Circle Item 17, postcard, last page.

Lock Rolling Machine

A universal lock rolling machine introduced to the sheet metal trade by Flagler Corp., Detroit, Mich., forms a male lock on one side and the female lock on the opposite side for any diameter pipe or duct. It can be equipped with roller dies to form both male and female section of a button, snap, slip, double seam, drive cleat, Pittsburgh, right angle flange and many other shapes.

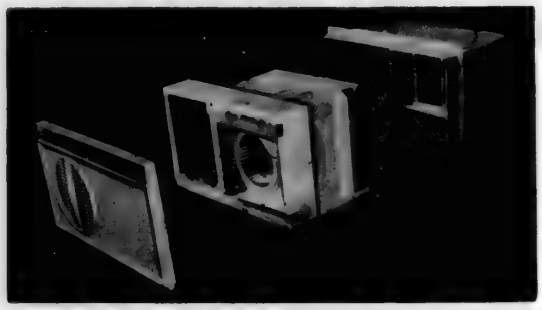


All sets of rolls are completely interchangeable, the company states, and top shafts are fitted into pillow block assemblies and equipped with easy-to-read micrometer adjustments. The machine is available in Models *A* and *B*, both 24 inches wide, 42 inches high, and 64 inches long. Model *A's* speed is 30 fpm with V-belt drive: Model *B's* speed is 90 fpm with roller chain drive.

More information? Circle Item 18, postcard, last page.

1959 Through-Wall Series

It's 1959 line of 18 through-the-wall conditioners, for motel, hotel, apartment house, and residential applications, is announced by Fedders Corp., Maspeth, L. I. Called the Wall-Fit line, the units in it are said to be designed for low operating noise and low voltage conditions. Included in the line are two Four Seasons heat pump models that can be applied as the sole source of heating and cooling in any part of the country, the company states. One of these has a heating capacity of 14,000 Btu at 25 deg F outside temperature, 10,000 Btu at zero deg, with an 1800-watt auxiliary strip heater which is actuated automatically when the compressor alone cannot satisfy the thermostat. A 250-watt humidifier is operative during the heating cycle. Switching to the cooling cycle is automatic.



In straight cooling models, the company offers twelve 1-hp and two 1½-hp units. Sleeves project into the space only 2½ inches. A volume control regulates the amount of air flow, which flow may be reduced until noise is eliminated. A volatge compensator permits efficient operation when voltage conditions are other than as rated.

In addition to the through-the-wall units, 25 window units are available, air conditioners for straight air cooling, heat pumps for heating, and units for both heating and cooling. Eight Adaptomatic central units are available, three for cooling and five heat pumps models, in 2 and 3-hp capacities.

More information? Circle Item 19, postcard, last page.

Small Packaged Boiler

Announced by Johnston Brothers, Inc., Ferrysburg, Mich., is Series 200 packaged boiler. Unit has a water-cooled rear combustion chamber that eliminates costly refractory maintenance, puts a stop to tube sheet crackage and failures, and prolongs tube life, the manufacturer reports.

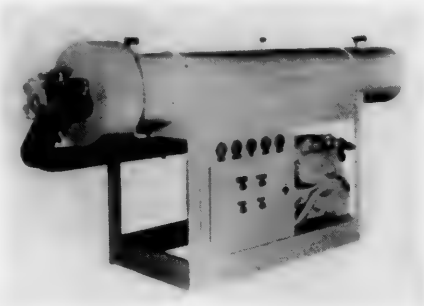
Modern electronic safety and programing controls combined with the latest design burners using oil or gas insure safe, quiet operation that is efficient and dependable, according to the company.

Boiler is available in nine sizes from 20 through 80 hp. Each can be fired with cold fuel oils, gas, or gas-oil combination, and has a pressure range from 15 to 150 psi steam and 30 psi hot water.

More information? Circle Item 20, postcard, last page.

Packaged Chiller for Schools

Herman Nelson School Air Systems Div., American Air Filter Co., Louisville, Ky., announces a new packaged liquid chiller. Reported to be the only packaged chiller specifically designed for schools, it functions as part of the unit ventilator air-conditioning system. The chiller is simple to operate, easy to maintain, and so efficient that it keeps perfect comfort temperatures in each individual classroom despite varying occupancy conditions, according to the company.



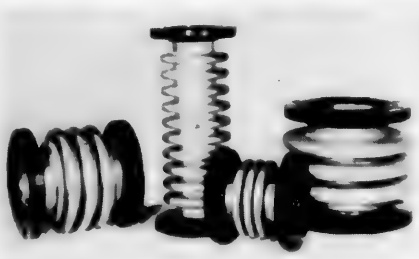
Chiller has an optional feature: a safety-interlocked control panel which completely eliminates any guesswork in operating the system. Indicating lights keep tabs on fan, pumps and control valves; indicating gauges show suction, discharge and oil pressures, and supply and return water temperatures. If a red light for any component turns on, the system automatically shuts down. The red light pin-points the source of any malfunction.

More information? Circle Item 21, postcard, last page.

Bellows-Type Expansion Joints

Tube Turns Div., Chemetron Corp., Louisville, Ky., has entered the field of flexible piping components. The company announced plans for a complete line of bellows expansion joints that will have a test-rated cyclic life.

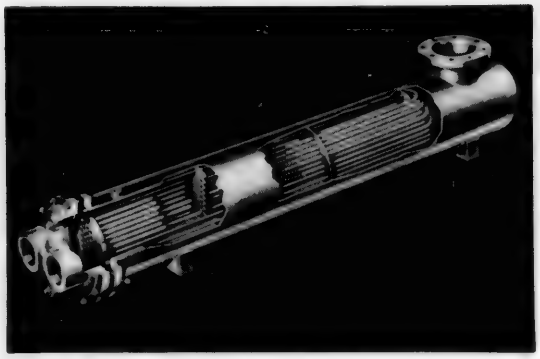
Illustrated in photo is a group of four of the new flexible fittings, including a 6-inch reinforced joint (left); a 4-inch, 10-convolution unreinforced joint with fixed flange ends (standing second from left); a 4-inch, 3-convolution unreinforced joint (third from left); and an 8-inch unreinforced joint (right). The bellows-type joints are stainless steel, and will be produced initially in 3- to 30-inch nominal pipe sizes for applications up to 750 deg F and 300 psi.



More information? Circle Item 22, postcard, last page.

Instantaneous Water Heaters

A fully standardized line of Ross instantaneous heaters, designed Type W.100, is introduced by Industrial Div., American-Standard, Detroit, Mich. An extra-large steam entrance beyond the tube bundle prevents tube damage by impingement and prolongs tube life, the manufacturer states.



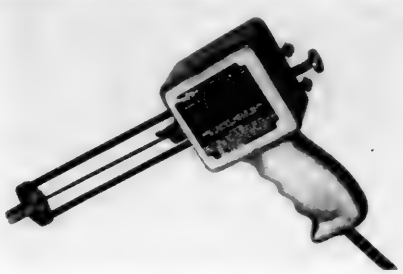
Standard construction consists of rugged steel shells, cast iron bonnets, and seamless copper alloy U-tubes. Simplified, compact design includes removable, pull-through tube bundles.

Available in 128 sizes with two- and four-pass arrangements, nominal tube lengths up to 10 ft, and shell diameters through 20 inches, heaters are suitable for practically every water heating requirement: service water, boosters, space heating convertors, radiant heating panels, snow melting equipment, swimming pools, storage towers and process work. Specially engineered units are built to handle other fluids.

More information? Circle Item 23, postcard, last page.

Arc-Spot Welding Gun

Brennen, Bucci & Weber, Inc., New York, N. Y., announce the Bren Weld arc-spot welding gun. Weighing less than 2 lb, the gun will spot weld sheet metal from one side, requiring no back up electrode. Employing an



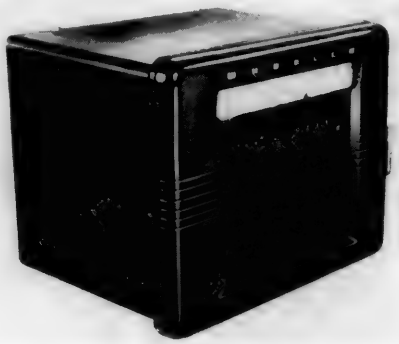
automatic time control, the gun is extremely simple to use. It has no triggers or levers to operate during the spot welding operation. It will weld galvanized as well as mild steel.

The gun is reported by the manufacturer to be indispensable for duct work, auto body repair, and all other types of sheet metal work.

More information? Circle Item 24, postcard, last page.

Multi-Switch Indicator

A multi-switch indicator, announced by Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill., rapidly checks temperatures at many points. Designated Series 9000, the indicator is available with switching details that



allow the instrument to be used for as many as 108 stations. Additional stations may be added by the use of an additional switch housing cabinet. The basic instrument is a completely self contained, null-balance unit and requires only the external sensing devices. The company states that it has been designed for long life and trouble-free service with every detail worked out to assure simplicity of operation.

More information? Circle Item 25, postcard, last page.

Apartment Building Conditioners

Its Hide-a-way series, consisting of compact air-handling units in sizes from 500 to 1100 cfm, is introduced by Hastings Air Control, Omaha, Neb., for heating and air conditioning apartment buildings. One of these units is installed in each apartment in a 4-sq-ft central closet, and short ducts deliver warm or cool air to individual rooms. Air is returned to the unit through a louvered door.

Manufacturer states that the units may be installed competitively with the simplest type of heating system, yet offers complete heating, ventilation, filtering, humidification and individual apartment control—plus the option of adding a mechanical chiller at any time for cooling.

Units are available for chilled or well water with 4- or 6-row coils, header or serpentine circuiting, and aluminum or copper fins. Standard equipment includes coil, blower, motor, adjustable drives, filter, cabinet and insulation. All parts are fully accessible from the front so that no clearance space is needed in back or on either side. Completely installed with piping, the unit requires a closet only 24 inches deep and 25 inches wide.

More information? Circle Item 26, postcard, last page.

Firing Rate is 40 Gph

Development of Model H-7 two-stage fuel unit, capable of maintaining a 40-gph firing rate, is announced by Hydraulic Div., Sundstrand Machine Tool Co., Rockford, Ill. It is specifically designed for commercial-industrial burners using either No. 1, 2, or 4 fuel oil. A newly-designed gearset of larger diameter and with

deeper teeth, based on the company's Rota-Roll principle, is said to permit this higher firing rate but with the same size body as units of half the capacity.

Units are designed for use on two-pipe installations with vacuum up to 20 inches when mounted with the valve underneath. An internal by-pass arrangement permits single-pipe gravity feed installations.

More information? Circle Item 27, postcard, last page.

Sealed Thermostat

Designed with sealed construction primarily for refrigeration and air-conditioning applications, Klixon Series 20420 thermostats, produced by Versailles Products Div., Metal & Controls Corp., Attleboro, Mass., are also suitable for other applications in their operating range of minus 20 to plus 167 deg F where sealed construction is needed.

All operating parts and lead connections are contained in a copper cup sealed with an epoxy resin compound to completely exclude moisture, dust, or other contamination. Unit is available with various configurations for mounting on tubing or flat surfaces. The thermostat can be used as a fan switch (contacts close on temperature rise) or as a high limit control (contacts open on temperature rise). Switching action is either single-pole, single-throw or single-pole, double-throw.

Fixed temperature settings give spot temperature control, unaffected by altitude or cross-ambient effect, at the point of thermostat application, and temperature settings are highly resistant to vibration, the company states. Electrical ratings for 6,000 cycles: 16 amps, full load, 120/240 VAC and 60 amps, locked rotor, 120/240 VAC (terminals 1 and 3). Ratings for 6,000 cycles on terminals 1 and 2: 15 amps, non-inductive, 120/240 VAC and pilot duty at 125 volt-amps, 120/240 VAC.

More information? Circle Item 28, postcard, last page.

Two Tempering Valves Announced

Introduced by Taco Heaters, Inc., Cranston, R. I., are two tempering valves for mixing hot and cold water to desired faucet temperatures. No. 518, illustrated, has a convenient handle for changing the adjustment; No. 519 has a concealed adjustment to avoid tampering with the valve. Both models have a temperature range from 120 to 160 deg F, and are available with ½-inch threaded connections.

Features include low cost; all bronze and stainless steel construction; and hermetically-sealed thermostatic element which avoids liquids or bi-metal.

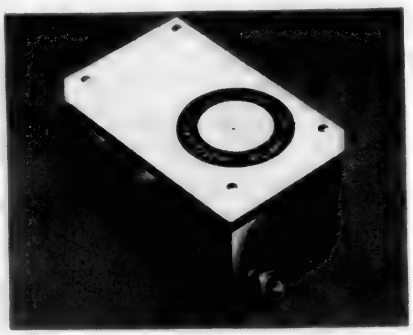
Thermostatic element creates sufficient power to crush most particles of foreign matter. If hot water entering the valve is at or below the setting, no cold water is admitted.

More information? Circle Item 29, postcard, last page.

Automatic Condensate Removal

Model AB-F self-priming, float-controlled, condensate removal pump, for dehumidifiers and other air conditioning and refrigeration equipment, is announced by March Mfg. Co., Inc., Skokie, Ill.

Unit provides automatic water disposal and eliminates overflow worry and expense, the company states, improves humidistat operation by removing water as fast as it collects, and enables placement of dehumidifier without regard to availability or location of the drain.



Company's air-bleed system is said to assure positive self-priming, even when the drip pan has been pumped dry or when evaporation has caused a dry pan. Float controlled for automatic operation, water level alone turns the pump on or off. Unit is molded of high impact plastic, only 3⅜ by 4 by 6¾ inches, and weighs 4 lb. Bottom inlet assures drainage of all the water in dehumidifier or air conditioner pan.

Pump will handle vertical lifts over 9 ft, and horizontal runs up to 300 ft with ¼-inch plastic or copper tubing, or hose.

More information? Circle Item 30, postcard, last page.

News of Equipment and Materials

Redesigned Packaged Conditioners

Two completely redesigned packaged air conditioning units (LU-411 and LU-511), rated at 40 and 50 tons cooling capacity, are announced by Air Conditioning Div., Westinghouse Electric Corp., Staunton, Va. These single-compressor units become part of the company's packaged air conditioning line, for commercial and industrial applications, that includes ten models rated from three to fifty tons.

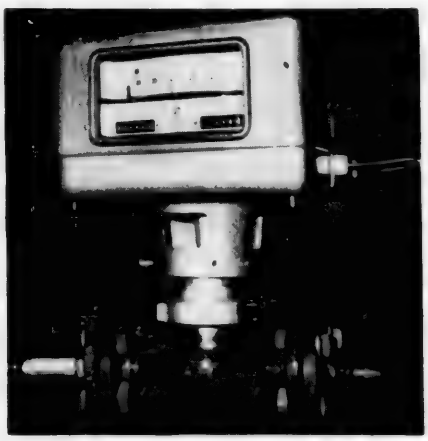
Major features of these new designs are application flexibility and compact size. The units use separate fan sections for vertical or overhung mounting with multiple fan discharges to fit any desired application. This separate fan section concept provides five different options for mounting the fan section, and means that any desired air flow pattern can be obtained, none of which requires any field modification. In addition, these units can be modified to make water connections on either end, and to locate the control panel on two alternate sides.

More information? Circle Item 31, postcard, last page.

Heat Pump Btu Meter

A new Pollux Heat Pump Btu meter is said to accurately measure both heating and cooling consumption in commercial installations. Air Conditioning Equipment Corp., New York, N. Y., the U. S. distributor, believes it to be the first mechanical Btu meter developed exclusively for use with the heat pump.

The meter makes it possible to charge tenants for both heating and cooling from a central heat pump installation through a single meter and in exact proportion to what each tenant uses. Formerly, the company says, landlords usually charged for heating and cooling services on a square foot or cubic foot basis. This often was inequitable, as a florist shop, for example, obviously uses



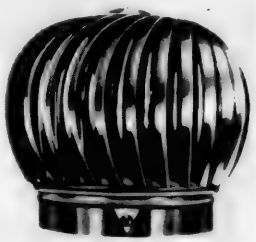
more refrigeration than a men's clothing store. The Pollux meter corrects such inequities by measuring in Btu's the precise amount of heat absorption or cooling at the point the water enters and leaves each tenant's space.

A mechanical device, the meter consists of a liquid meter, an integrator and two temperature-sensing bulbs. One bulb is placed in the supply line and the other in the return line. The difference in water temperature between the supply and return lines is multiplied mechanically by the integrator with the flow of water which has been converted to net weight. The result in Btu's is shown cumulatively on a digital counter on the face of the meter. One dial shows heating, a second cooling, depending on what cycle is in use. Also shown is the instantaneous temperature.

More information? Circle Item 32, postcard, last page.

Improved Rotary Roof Ventilator

An improved rotary roof ventilator, known as the Western Rotary, is announced by Western Engineering and Manufacturing Co., Venice, Calif.

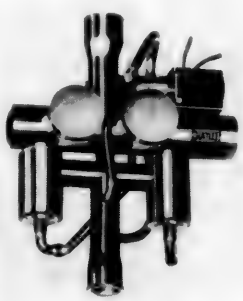


This improved rotary, according to the firm, comes out of 38 years experience in many fields of installation, including the military. Now there is a ball-bearing suspension that reduces friction losses—protection assured by a lifetime guarantee. There is a totally enclosed, wool-packed lubricant reservoir. There is a new support assembly, including rubber iso-mountings. In addition, the baked enamel paint finish has been improved, the company reports. These and other improvements are said to contribute to more quiet operation and longer life.

More information? Circle Item 33, postcard, last page.

Larger Reversing Valve

The Chatleff Valve & Mfg. Co., Austin, Tex., adds a 15 to 20 ton reversing valve to its line. Model CR-770, like the company's smaller valves, is full seating and features Teflon against brass.



It is designed for operations up to 400-lb MOPD and is internally cushioned so that the valve shifts quietly and smoothly even at extremely high pressure differentials. It may be applied to refrigeration systems of any temperature; from comfort heating to deep refrigeration defrosting.

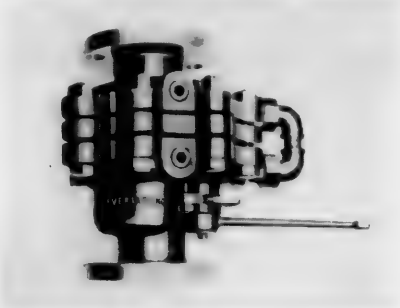
The company has succeeded in simplifying this essential and formerly expensive component. The new valve line will offer a significantly lower unit cost, not only in valve cost but in the savings a tailored design can offer.

More information? Circle Item 34, postcard, last page.

Steam-Jacketed Valve

Freer flow of numerous types of viscous materials through valves, essential in many of today's complex industrial operations, is assured with the newly designed steam-jacketed valve from Everlasting Valve Co., Jersey City, N. J.

In this latest design, the company has extended the valve jacketing over the neck to provide more complete jacketing surface. The jacket space surrounds the port



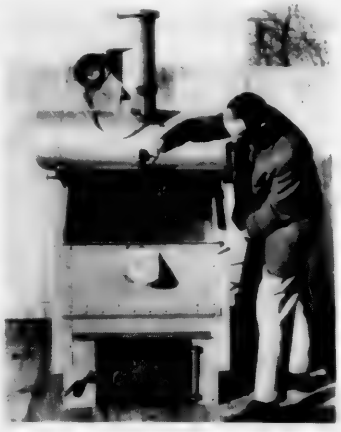
openings, as well as the body, to assure complete fluidity of the material passing through the valve. Straight-through, full-flow is assured when this valve is open.

Valve is offered in two models. One is furnished with an iron body for 125 psig line pressure with a 250 psig jacket pressure. The second has a cast steel body for 150 psig pressure with a 300 psig jacket pressure.

More information? Circle Item 35, postcard, last page.

Burns Fuels and Rubbish

A multi-fuel furnace, known as The Shop Heater, featuring new stack and firebox principles to allow for the burning of conventional fuels plus all kinds of rubbish, including rubber, and for the delivery of clean heat free of smoke and odors, is produced and marketed by Mastro-Hoskinson Mfg. Corp., Inc., Franklin Square, L. I., N. Y.



According to its inventor, the compact unit's engineering principles for the burning of smoke and toxic gases have been satisfactorily demonstrated to representatives of the New York State Board of Standards and Appeals, and for New York City's Department of Air Pollution Control; and because of its high draft induction principles, it has also proven satisfactorily its ability to perform as both a heater and as a rubbish disposal unit for diversified commercial businesses.

The heater, which is now being marketed in New York City, has already been sold and installed in many business locations on Long Island; among them: a bank, a lumber yard, a storm and sash plant, and in a large scrap metal yard, where it is being used mainly to burn rubber and insulation from copper wire. Its uses are also many for the heating of all types of out-buildings for industry, on the farm, and for food markets.

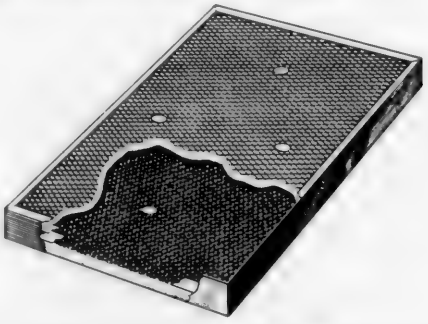
Thermostatically controlled, the new heating unit burns oil, gas, coal, wood, and rubbish. Its weight is 1,000 lb and it delivers 400,000 Btu's when fired with gas or oil, and up to 500,000 Btu's when burning rubbish. A removable heat exchanger can be slipped out of the furnace and cleaned in five minutes. An 1900- to 3600-cfm fan permits ducting, and because the oil or gas burner is mounted on a track, the heater can be converted in seconds from an oil or gas burner to a rubbish disposal unit simply by sliding the barrel of either unit out of a trap door in the rear of the furnace.

While the heater has been designed principally for use as the main heating unit for plant and shop facilities comprising up to 5,000 sq ft, it is also adaptable as the supplemental unit to a central heating system in a large plant by burning refuse, oil, gas or coal.

More information? Circle Item 36, postcard, last page.

Flame Baffle Grease Filter

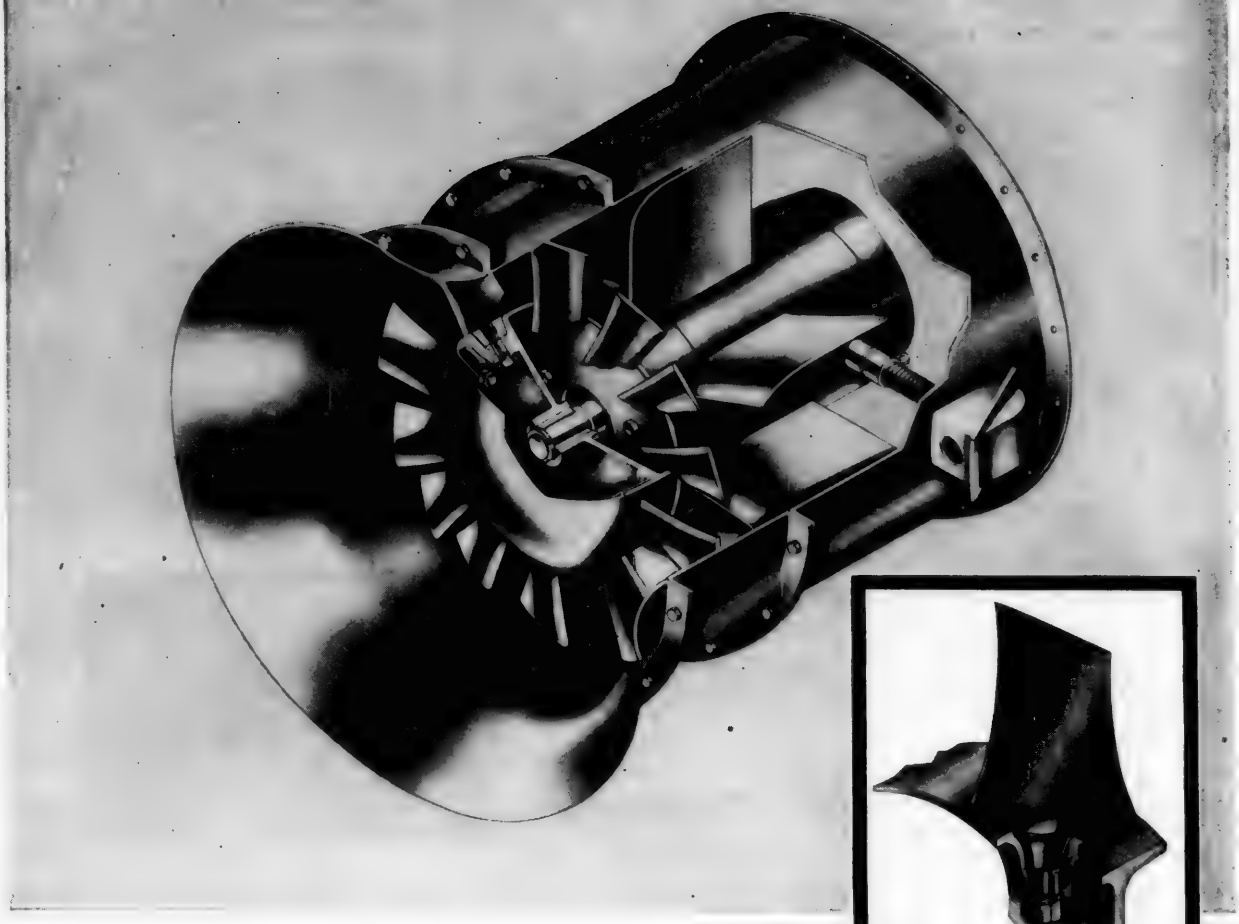
A three-stage, double-flame-baffle grease filter, said to reduce fire and health hazards to an absolute minimum, is offered by Extraer Inc., Houston, Tex. According to the manufacturer, it was designed and developed specifically for this hazard, and exhaustive practical and laboratory tests have borne out the claims for it.



The advantages claimed are: higher percentage of grease removed; no back drip; ease of cleaning; and, with double flame baffle features of two filters in one, with an air space in between, practical elimination of the cause of flame flash through filter into duct work.

Filter consists of two filter units in a single steel frame, separated by a $\frac{5}{8}$-inch air space which acts as a cooling and solidifying chamber. The entire unit is made of heavy-duty metal and is said to last indefinitely under normal use. Filter will be manufactured to fit all standard and non-standard grease canopy hoods now used in school cafeterias, restaurants, and in all other food processing institutions.

More information? Circle Item 37, postcard, last page.



YOU CAN CHANGE BLADE PITCH

TO CHANGE VOLUME AND PRESSURE WITH

JOY AXIVANE FANS

If calculated and operational requirements differ . . . if system characteristics change . . . or if resistance is difficult to predict —Joy fans can solve your problem. The blade pitch is adjustable. The factory blade-setting can be changed quickly to provide either a wide pressure-range for any particular volume or a change in volume. The inset photograph shows how this can be done using only a common wrench.

Other advantages: The motor is inside the fan . . . no drive losses. This makes the fan unusually compact and efficient . . . easy to mount. There are *1600 standard models* in all combinations of horsepower, pressures, and volumes. Also available with V-belt drives. Send in the coupon now for complete information.

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company

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I am interested in Joy Axivane Fan information on:

Film Has Construction Uses

The Dow Chemical Co., Midland, Mich., announced that it has begun production of polyethylene film for construction and agricultural uses. Tradenamed Polyfilm, the new product will be produced by Extruders, Inc., a wholly-owned Dow subsidiary located in Hawthorne, Calif.

Dow has developed a unique dispenser package for Polyfilm which keeps the loose end of the film ready for unwinding and cutting, and provides easier use at the job site. The rectangular shape of the container also facilitates storage for wholesalers and retailers.

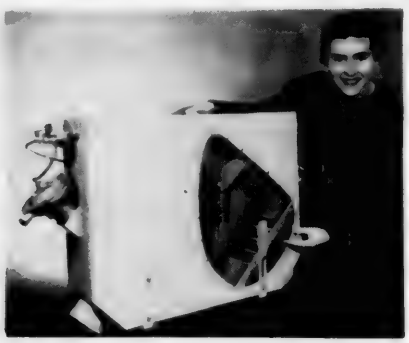
Photo shows two uses of the polyethylene film. Large sheet being held by workmen will serve as moisture barrier under concrete slab. Window coverings enclose building temporarily during inclement weather.

More information? Circle Item 38, postcard, last page.

Line of All-Air Terminals

A complete line of high velocity room terminals for all-air systems is announced by Carrier Corporation, Syracuse, N. Y. Three models introduced handle from 50 to 1700 cubic feet of air per minute, offering a wide range of application.

Each of the three model lines has been individually designed for a different system. They include double duct, single duct with reheat, and dual conduit.



These Weathermaster blending boxes are suitable for both exterior and interior spaces of office buildings, hospitals, hotels, schools and laboratories. They are particularly suitable for odor dilution and maintenance of relative humidity despite changes in room occupancy.

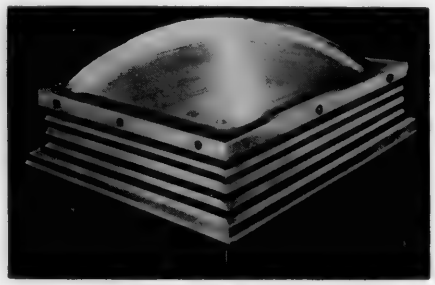
Versatility in arrangement of external controls, mounting rods, and design aids installation whether in the ceiling, under the window or for sidewall locations. Further adaptability to either interior or exterior locations is provided by standard accessories such as ceiling diffusers, sidewall grilles, plenums for multiple outlets and floor mounted cabinets.

Two other features cited are the minimum distance (¾ inch) traveled by sliding damper blades, and effectiveness in eliminating sounds from high pressure air.

More information? Circle Item 39, postcard, last page.

Daylighting-Ventilator Unit

A combination daylighting and ventilating unit is announced by E. Van Noorden Co., Boston, Mass. Called Vanco Penthouse Louverdomes, they are designed for on-roof installations which require both overhead lighting and ventilation.



The factory assembled unit consists of Vanco Domelites set on extruded aluminum louvered penthouses. The Domelites, made of shatterproof, weather-resistant, one-piece Acrylic Plexiglas, are said to provide an even transmission of light. Louvered penthouses of extruded aluminum provide four-sided ventilation.

Designed to blend with modern architectural lines, units are available in either square or rectangular shapes in a wide range of sizes and are available in any height in increments of 4 inches.

More information? Circle Item 40, postcard, last page.

Non-Return Boiler Valve

A cushioned, single-acting, non-return boiler valve, offered by Golden-Anderson Valve Specialty Co., Pittsburgh, Pa., can be tested without dismantling. Valve is designed to close when boiler pressure decreases to a point below the header pressure or to automatically cut the boiler in when its pressure equals header pressure.

To determine if working parts are moving freely, it is necessary only to open a valve on a test line. This relieves pressure on the main valve and causes it to close. Increased pressure on the boiler gage indicates satisfactory operation.

Supplied in elbow, globe, and angle body styles, and in three yoke styles, the valve is so constructed that no automatic moving part contacts a corrosive part at any time during operation.

More information? Circle Item 41, postcard, last page.

*ONE MILE OF STRIPLINE (slot type) DIFFUSERS

Architects — Perkins & Will, Chicago, Ill.
Air Conditioning & Ventilating Contractors — The Robert Irsay Co., Skokie, Ill.

Installed in Administrative and Research Center

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Skokie, Illinois

STRIPLINE . . . Versatile, Inconspicuous, Practical

all photos by Hedrich-Blessing, Chicago

Stripline slot type diffusers guarantee the greatest possible uniformity of air flow while enhancing the modern architectural design.

Regardless of length of the Stripline diffusers installed, these slot type units provide unvaried distribution of noiseless, draftless, conditioned air. Cold or hot spots are completely eliminated.

Stripline is versatile . . . inconspicuous . . . practical . . . , can be located anywhere to suit the interior design . . . in walls . . . ceilings . . . coves . . . moulds . . . window stools.

For complete engineering data ask for Stripline catalog.

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air diffusers • filters • exhausters
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Sold exclusively by representatives for:

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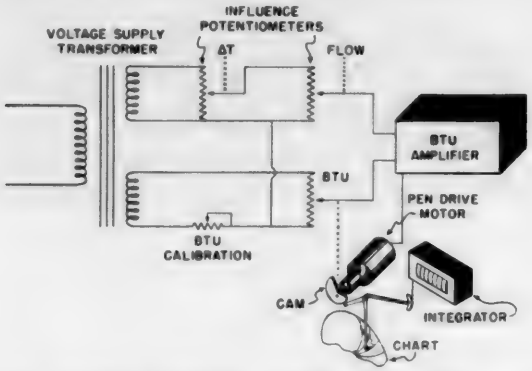
New Btu Recorder

Primarily designed for use in measuring heat transfer in hot water generators, cooling towers, refrigerating systems, and other such applications, Model 913 Btu meter is available from The Hays Corporation, Michigan City, Ind. A single recorder is used to continuously record, indicate, and integrate Btu loss or gain in a flowing liquid. Also on the same chart, temperature differential and flow rate of the liquid are recorded.

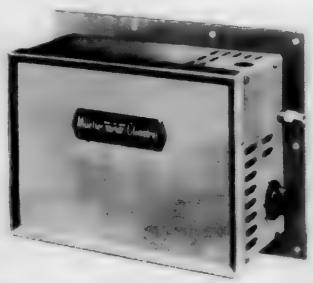


Two platinum resistance temperature elements, differential connected and measuring inlet and outlet temperature of the liquid, form two legs of a resistance bridge in which the differential temperature receiver in the recorder acts as a rebalancing unit. Liquid flow through the process, measured by a Hays Model 245 flow transmitter, is also recorded. Differential temperature and flow retransmitting slidewires on their respective receiver units are connected so as to multiply their respective signals. This product represents number of Btu's gained or lost per unit of time by the liquid as it passes through the process. Btu signal is directed to the Btu receiver unit, where it is rebalanced and recorded.

More information? Circle Item 42, postcard, last page.

Electric Furnace Humidifier

Positive humidity control is assured with a new electric humidifier for furnace installation, according to the manufacturer, Mueller Climatrol Div., Worthington Corp., Milwaukee, Wis.



Model 50-800 provides humidification at a rate up to 26 quarts per day, adequate to keep most homes at a comfort level under average dry air conditions. This is accomplished with an 800-watt Nichrome electrical heating element immersed in the water pan. Evaporation may be controlled either by a dial setting on the unit, or by use of a humidistat mounted in the living area. The complete elimination of needle valve and float avoids problems of clogging or disintegrating which may cause faulty or complete loss of operation, the company reports.

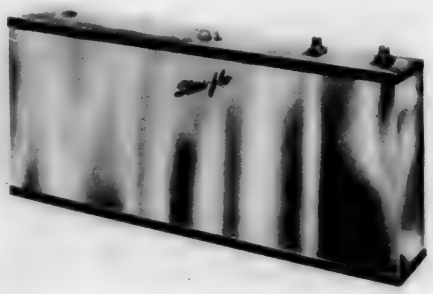
Water level is controlled by a counterbalanced reservoir pan activating a solenoid valve whenever water is needed. All controls are outside the heated area, so hard water deposits cannot affect their operation. A twin liner pan makes disposal of hard water deposits easy. An inner pan of aluminum can be thrown away and replaced when deposits build up, usually about once a year in hard water areas.

More information? Circle Item 43, postcard, last page.

Non-Chemical Water Sterilizer

A water sterilizer, built by Steri-flo Corp., Waldwick, N. J., uses ultra-violet light to make contaminated water safe to drink. No addition of chlorine or other chemicals are needed, the company states. Models range from 30 to 2000 gph capacities.

According to the manufacturer, the unit applies to drinking water the same principles used to sterilize atmosphere in hospital operating rooms, and is guaranteed to purify heavily polluted water from wells, streams, or cisterns without adding any taste or odor. It is said to have been certified by leading laboratories and public health authorities.



Sterilizer requires no attention and, in household models, uses no more power than a lighting fixture. It consists of a cabinet-enclosed stainless steel sterilizing chamber through which water passes in direct contact with a battery of low-pressure, cold-cathode ultra-violet tubes. These are of Vycor glass, developed by Corning Glass Works to transmit through water ultra-violet waves of 2537 Angstrom units. The contaminated water receives thorough penetration and reaches the point of delivery free of harmful bacteria, safe for drinking and for all farm, dairy and domestic uses.

While the sterilizer is furnished with a pilot light for visual evidence of operation, complete protection is said to be provided by automatic controls. If the unit fails to operate, a solenoid valve instantly shuts off the water supply so that unsterilized water can never be accidentally consumed. A by-pass permits unsterilized water to be drawn if needed until service is restored.

More information? Circle Item 44, postcard, last page.

Climate by Chrysler

. . . more than just coolness, costs less than you'd expect!

When you select Chrysler Air Conditioning, you have the largest choice of units in the industry. And every unit includes—as standard equipment—important features that would cost up to $364 to add to conventional air conditioning.

The Chrysler line of packaged air conditioning contains almost 300 combinations of water-cooled and waterless equipment . . . in capacities from 3 to 45 tons. You'll get exactly the right model and capacity for your job—never under or over-sized.

And every unit will be complete with features found as standard equipment on no other air conditioning. Mild weather control, oil purifier, electronic safety controls, quick-response expansion valves. And you can specify optional accessories like Chrysler's exclusive electrostatic air purification system and all-weather operation control.

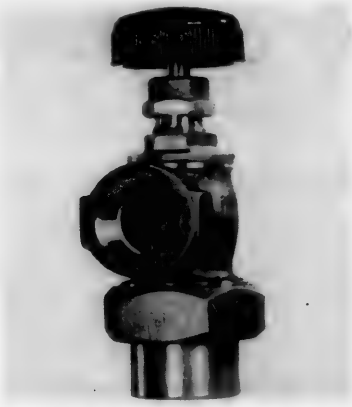
Climate by Chrysler means more than just coo'ness. Your clients will enjoy low-cost year-around comfort that only true air conditioning can provide. That's the reason more businesses do more business with Chrysler Airtemp—the company that pioneered packaged air conditioning. Get all the facts. Write: Airtemp Division, Chrysler Corp., Dept. I-49, Dayton 1, Ohio.

CHRYSLER AIRTEMP

FIRST WITH THE FINEST IN AIR CONDITIONING

Convector Steam Angle Valve

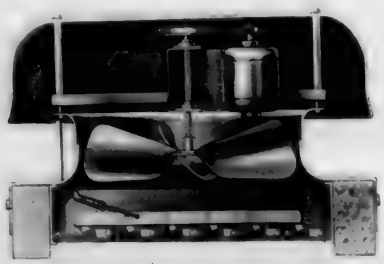
Model CF-151 convector female union steam angle valve is added to its line by Marsh Valve Co., Dunkirk, N. Y. Made specifically for installation on convector radiators, it is said to facilitate installation. The customer must specify if he wishes a loose bonnet assembly on delivery.



Available in both 1 and 1¼-inch sizes, the valve has both a female pipe end and female union coupling. Rugged boss lugs at the female inlet connection expedite and provide fast positive wrenching, the company states. At the outlet female union lug guides are situated inside.
More information? Circle Item 45, postcard, last page.

Belt-Driven Propeller Ventilator

Model QL belt-driven propeller ventilator has deep-pitched aluminum blades which deliver high capacity at low rpm, according to the manufacturer, Loren Cook Co., Berea, Ohio. Fan speeds range from 219 rpm on the 48-inch model to 690 rpm on the 24-inch size.



For offices, auditoriums, schools, labs, etc., where quiet operation is a necessity and static pressure is ¼ inch or less, the lower-priced Model QL will approach the same cfm as the company's centrifugal belt-driven units. Operation is equally quiet.

Lightweight aluminum construction saves roof load, facilitates lifting and installation. Even the belt drive power assembly is aluminum. It supports the motor bearings and sheaves, and floats on vibration isolators. The motor is totally inclosed, and motor bearings are sealed. Maintenance or inspection of the belt is done from the roof by removing four cap nuts and lifting off the spun aluminum top cap. The venturi-type spun aluminum base contains integral conduit for easy wiring.
More information? Circle Item 46, postcard, last page.

Universal Pipe Hanger Ring

A universal adjustable pipe hanger ring, developed by "Auto-Grip" Div., "Automatic" Sprinkler Corporation of America, Youngstown, Ohio, provides a single unit which can be used in most applications in place of most other types of pipe hanger rings. The ring thus reduces inventory investment, storage space requirements, and purchasing costs.

As illustrated, ring consists of a metal band and a locking insert for attachment to a threaded hanger rod. Because of low initial cost and reduced installation time, installed cost is lower than that of other types of hanger rings, the company states. The insert is self-locking through spring action as well as through the weight of the pipe supported.

Ring is available in zinc or copper plate as standard, for pipe sizes from ½ through 3½ inches. The band may be readily reshaped on the job if conditions require it. Other finishes or special metals are available on special order. The wide band makes the ring well suited to installation of plastic pipe. Ring may be safely loaded to 500 lb.
More information? Circle Item 47, postcard, last page.

Filter for Air, Gas Lines

An Air Line Ultra Filter that provides high efficiency filtration for compressed air and other gas lines is introduced by Mine Safety Appliances Co., Pittsburgh, Pa. The filter is designed primarily for use in pneumatic control, instrument and pharmaceutical air lines. spray application of paints and other finishes, and purification of other compressed gases. Minimum removal of particulate 0.3 micron and larger, at rated flows, is 99%.

Unit's standard assembly provides mechanical filtration of particulate matter, including dusts, mists. fumes and smokes, as well as airborne bacteria. Several special chemical cartridges are available as accessories to remove other contaminants in the gaseous phase. Each accessory cartridge can be added to the filter in the field, and all but one can be used with the particulate filter.

Maximum operating temperature of the filter is 250 deg F, while maximum operating pressure is 125 psig. Special units for operating pressures as high as 500 psig are available.
More information? Circle Item 48, postcard, last page.

As functional as it is attractive . . .

New H. J. Heinz research center is another endorsement for Transite® Vent Pipe!

Architects and Engineers:
Skidmore, Owings & Merrill
Partner in Charge: Gordon Bunshaft
Consultants on Mechanical Engineering: Jaros, Baum & Bolles
General Contractors:
George A. Fuller Company

Visit the H. J. Heinz Company's new Research Center and you see a strikingly attractive structure . . . *and every bit as functional!* Here—every design detail, every material used contributes to greater scientific productivity.

Within the many laboratories—equipped to test foods for taste, aroma, color, appearance—there's a marked accent on cleanliness. Every piece of equipment is planned to prevent contamination, to stay clean and rust free. That's why corrosion-resistant Transite Industrial Vent Pipe was chosen to vent every one of the Research Center's laboratories.

Whether used indoors or out, Transite offers you many advantages. Made of asbestos-cement, Transite retains its original, attractive appearance. *Saves on upkeep* because it never needs painting or preservative coating. *Saves on maintenance* because it resists the attack of most gases, mists, fumes and dusts . . . is unaffected by weather.

For further information on Transite Industrial Vent Pipe, write to Johns-Manville, Box 14HV, New York 16, N. Y. In Canada, Port Credit, Ontario.

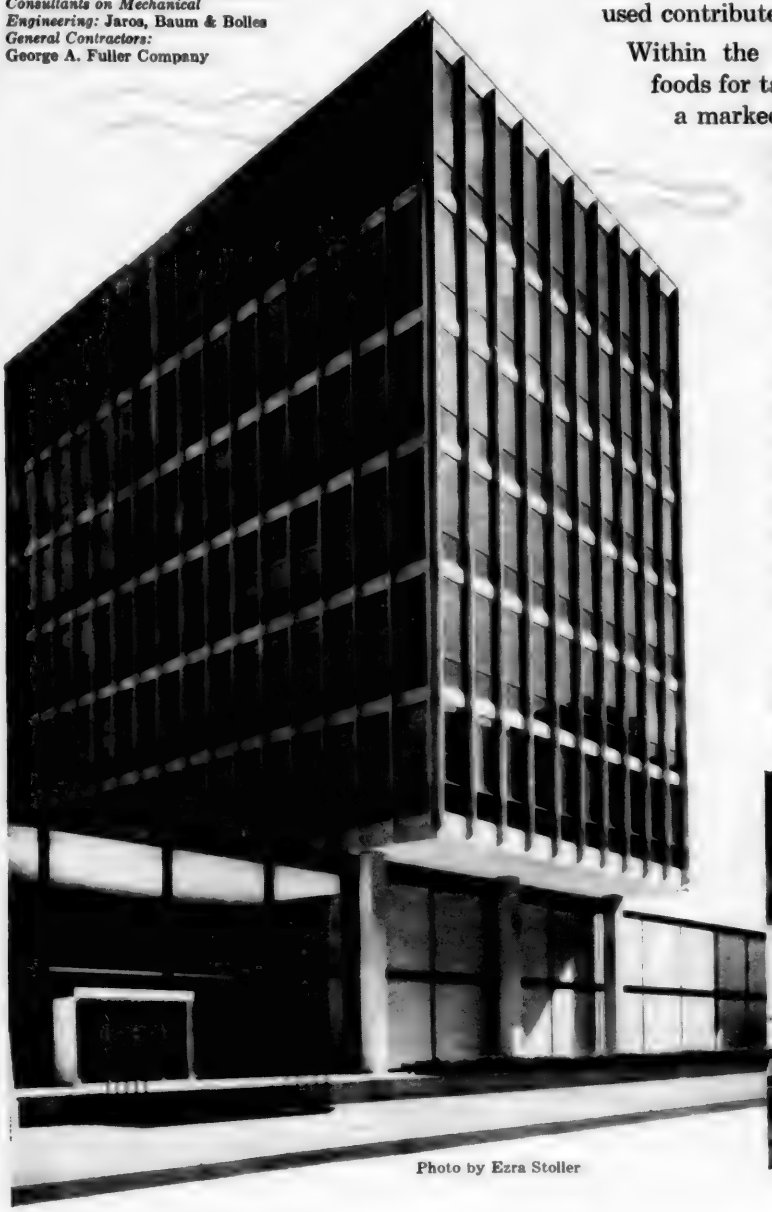


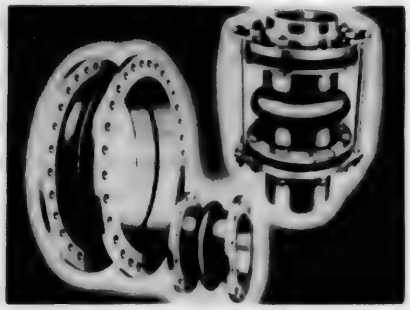
Photo by Ezra Stoller

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

Spool-Type Expansion Joints

Expansion joints for chemical, oil, water or exhaust steam lines, operating at temperatures from 180 to 200 deg F, are available from Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N. J., in sizes from ½ to 78 inches. Designed for either pressure or vacuum operation, these joints offer the high strength and flexibility necessary to give protection from internal expansion and contraction, vibration, corrosion and erosion, and to compensate for misalignment. Joints eliminate electrolysis, are not subject to embrittlement with age, and offer maximum resistance to shock.



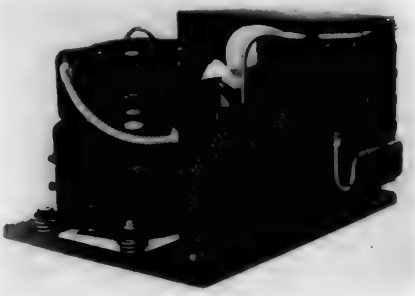
The spool-type expansion joints, illustrated, are especially compact and provide long life even at elevated temperatures. Other types available include straight sleeve, Navy and Maritime Commission approved types.

More information? Circle Item 49, postcard, last page.

Single Fan Condensing Units

Two compact 1-hp, R-12, condensing units are announced by Bendix-Westinghouse Automotive Air Brake Co., Evansville, Ind. They are of single fan construction with capacities said to be comparable to those obtained with units of twin-fan construction.

Single fan construction provides a compact unit for manufacturers with limited mounting space available in their fixtures. The over-all height of the single fan unit remains the same as the twin fan unit while width and length are reduced materially.

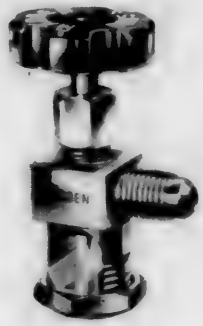


The condensing units are designated Models BRL100T and BRH100T. Twin cylinder motor compressors are designed to operate on 230 volt, single phase or 208/220 volt, three phase current, with refrigerant 12.

More information? Circle Item 50, postcard, last page.

Tube Piercing Valve

Madden Brass Products Co., Aurora, Ill., introduces a new tube piercing valve, Model HP-810, for piercing ½ and ⅝-inch OD tubing. One valve pierces two tube sizes. Designed to simplify use by servicemen, it can be installed in any position without use of special tools or openers. Because of its 2-piece construction, lost parts are eliminated; V-block and nut are combined in a single unit.



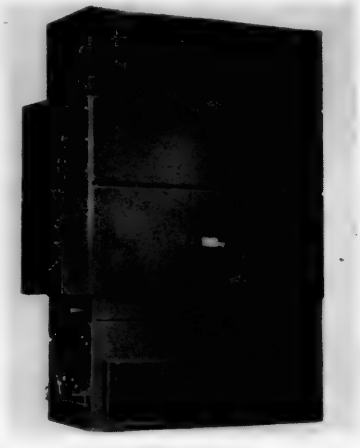
Made from extruded brass stock, the HP-810 features a one-piece body and sealing gasket that can not slip or fall out. It automatically centers the tube for perfect piercing and sealing, the manufacturer states.

This valve can be installed in any position on soft copper, aluminum, or brass tubing wherever a liquid, gas or air flow is desired. There is no need to disconnect or shut off supply, since valve can be quickly and easily installed on lines under pressure.

More information? Circle Item 51, postcard, last page.

Quiet Heating-Ventilating Unit

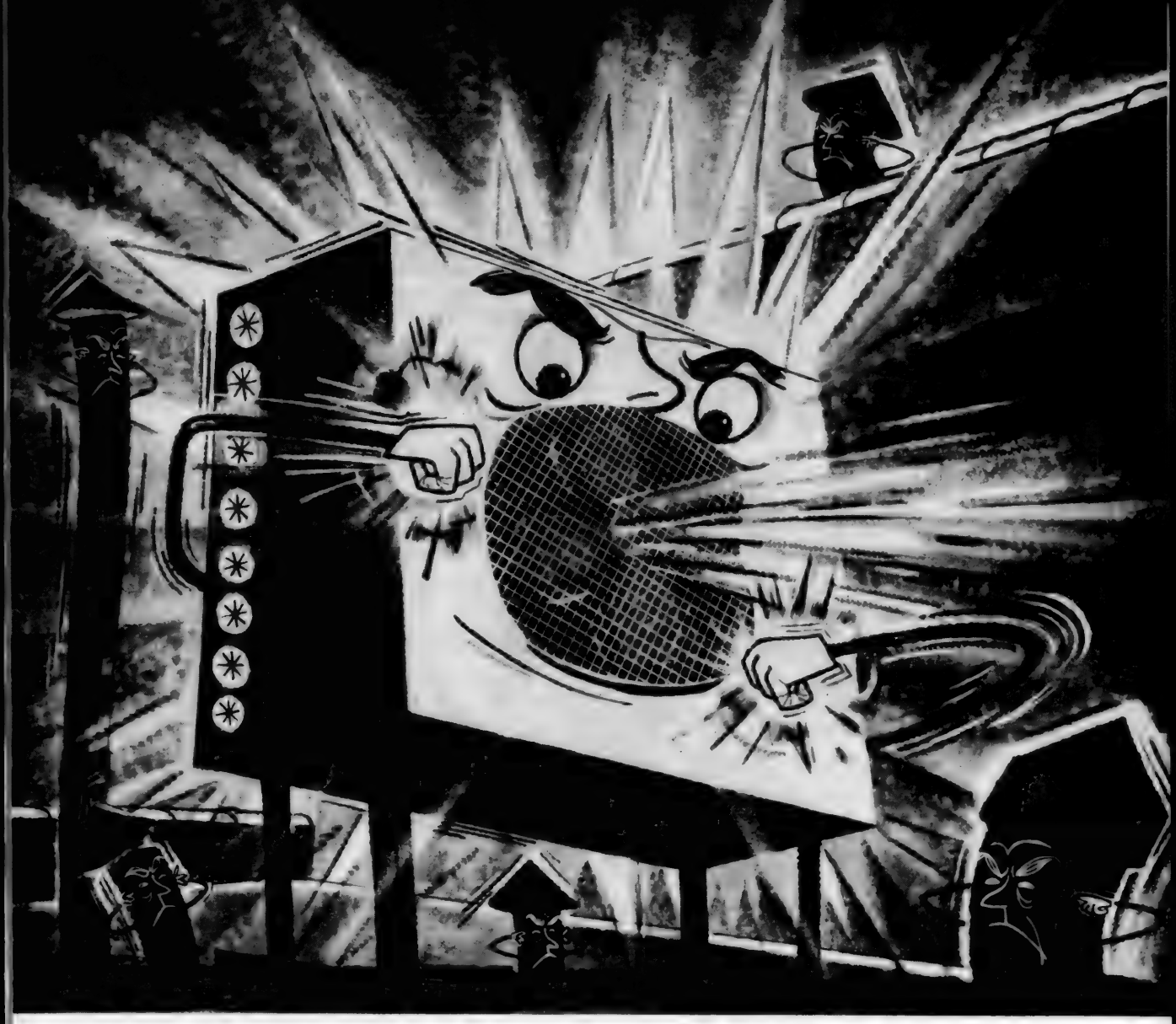
Seasonvent is a line of large-capacity heating and ventilating units said by its manufacturer, McQuay, Inc., Minneapolis, Minn., to be super quiet. The units are manufactured especially for school auditoriums, theaters, and similar installations where smooth, quiet operating is a necessity.



Units are available in nine sizes for low static applications, 0 to ⅝ inches, and seven sizes for high static applications, ¾ to 1¼ inches, with capacities ranging from 1250 to 15,000 cfm.

All models are equipped with sound absorbing plenum and fan motor internally mounted. All are available in horizontal, vertical, or wall mounting arrangements.

More information? Circle Item 52, postcard, last page.



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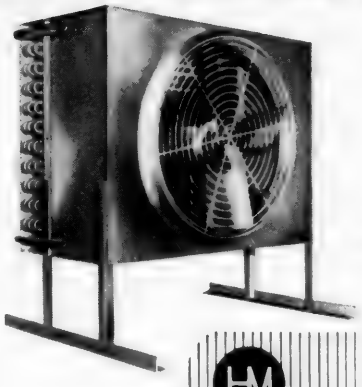
Fan noise, vibration and rattling have been engineered out of H&M air-cooled condensers. Deep pitch fans are run at slow speeds. Casings are rugged; won't loosen with use.

H&M condensers are completely dependable. The large coil and exclusive Turbu-Flo fins improve heat transfer by up to 15%. Fins are spaced widely to avoid clogging by dirt and other air-borne particles.

Winter operation is easy, too, with H&M's special modulating valve. Halstead & Mitchell air-cooled condensers are available in propeller fan or blower models. Multiple circuiting at no extra cost. Ask your local distributor for complete information, or write to Halstead & Mitchell, Bessemer Building, Pittsburgh 22, Pa.



H&M AIR-COOLED CONDENSER

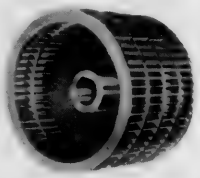
HM

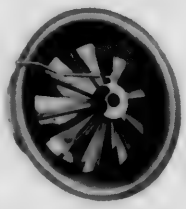
Halstead & Mitchell

Water-Cooled Condensers · Cooling Towers · Air-Cooled Condensers · Finned Coil Products

Mechanical Draft Fans

A complete line of forward curved mechanical draft fans, designed to provide a high air movement to size ratio, has been developed by Chicago Blower Corp., Franklin Park, Ill. Designed for heavy duty induced draft operation, the fans feature economical first cost, high operating performance, and quiet operation.





By using a large number of forward curved blades, fans can handle large volumes of air or gas within minimum space requirements. All blades are formed of mild or alloy steel, depending on duty. Housings are continuous-weld, heavy steel plate, rigidly braced.

Quiet operation is assured by several design features. Rotor, at top in photo, operates at low peripheral speed. Streamline inlets direct the air into the rotor with a minimum of turbulence. Oversized inlet boxes reduce entering velocity, cut noise further, and provide good air distribution to the wheel.

Inlet vane control, at bottom, may be either manual or automatic, as desired. Movable vanes spin the incoming air in the direction of the wheel's rotation. By changing the spin, fan output can be varied.

More information? Circle Item 53, postcard, last page.

Brass Submergible Pumps

A line of solid brass submergible pumps has been developed by Thomas Beckett & Co., Inc., Dallas, Tex. Three models (115V or 230V) with a capacity range, at 1-ft head, of 200, 300, and 500 gph are available.

These pumps are designed for operation when completely or partially submerged, and are permanently sealed in oil for lifetime lubrication. Other features include a high torque, low temperature motor. A leakproof terminal block prevents oil escape through lead wires.

Pumps are suited for application in ice machines, beverage and milk coolers, condensate removal, fountains, and machine tool coolants.

More information? Circle Item 54, postcard, last page.

Compression Fittings for Pipe

Introduction to the plumbing field of a line of compression fittings for joining pipe up to 2-inch dia is announced by Dresser Manufacturing Div., Dresser Industries, Inc., Bradford, Pa.

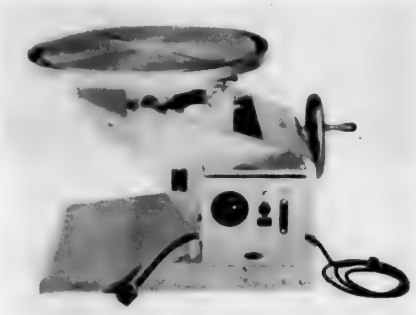
Available in over 6000 types and sizes, the compression fittings have threaded end-nuts that screw onto the threaded body to compress the resilient gaskets and make a tight yet flexible seal. This eliminates need for threading, exact pipe fitting, or other fussy pipe-end preparation for close-quarter piping in hard-to-get-at locations.

Fittings can be used for joining pipe carrying gas, water, sewage and dozens of other types of line contents. The only joining tool required is a wrench. Their flexibility permits 1/16-inch pipe movement, as well as pipe deflections up to 6 degrees.

More information? Circle Item 55, postcard, last page.

Turntable Welding Positioner

The load capacity of a turntable welding positioner, available from Miami Specialties Co., Troy, Ohio, is 500 lb at a center of gravity 6 inches above the table surface and 3 inches off center of rotation. Infinite speed range is available from ¼ to 5 rpm. A heavy-duty 110 volt d-c shunt-type motor is used in conjunction with a two-speed reduction gear box. The table speed is constant; direction of rotation is reversible. Table can free-wheel



by placing the speed selector in the neutral position. This enables the operator to balance the load, and is convenient for some jobs where power turning is not desirable.

Sheet steel control panel is mounted rigidly to the frame of the positioner; it can be removed for remote mounting on a pedestal. The table top can be tilted up to 135 degrees while loaded. The table top is removable, permitting the use of tops that are fixtured for special jobs to be quickly mounted on the unit. A limit switch is provided for down-limit protection when the tilt mechanism is motorized.

Dimensions are 27½ inches from floor to table top. Base is 32½ inches long and 22½ inches wide. The slotted turntable top is 26 inches in diameter. Weight is 490 lb.

More information? Circle Item 56, postcard, last page.

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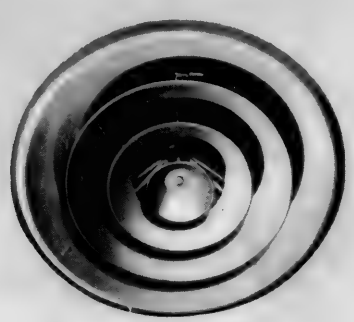
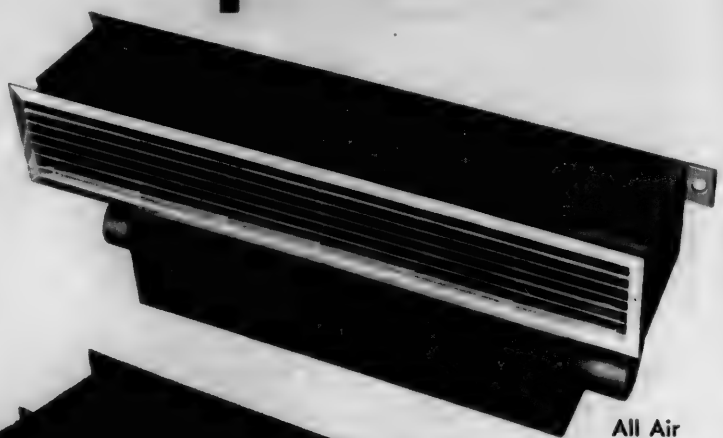
Today Anemostat offers an impressive variety of air diffusion equipment to meet every architectural and engineering requirement. ANEMOSTAT® is a registered trademark. It is your guarantee that every unit bearing this name is of highest quality . . . backed by the most experienced engineering, research and testing laboratories in the industry.

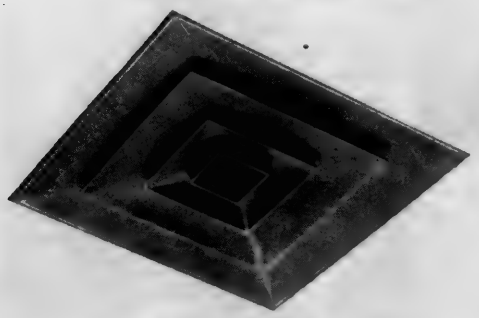
When Anemostat Air Diffusers are in sight the system is right. This was true yesterday, is true today and will be true tomorrow.



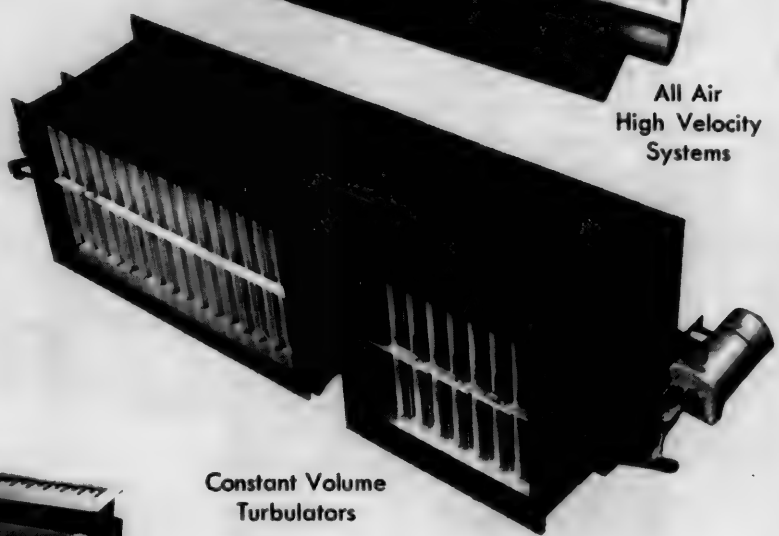
Conventional Air Diffusers



All Air High Velocity Systems



100% Induction Air Diffusers



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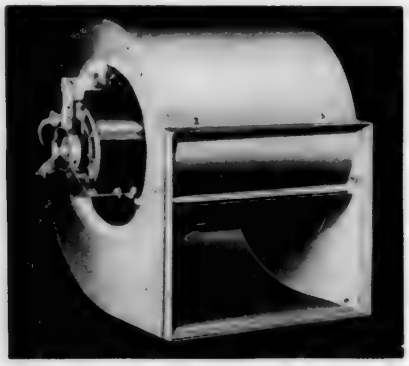
Ten-Inch Blower

A compact 10-inch direct-drive blower, with ½-hp motor, is announced by Lau Blower Co., Dayton, Ohio. Designed for residential central air conditioning systems, it will move air at a maximum rate of 2550 cfm at 0.55 inches of water, and a minimum rate of 1000 cfm at 1.2 inches of water.



Unit measures 13⅛ inches across the blower housing with an additional 2½ inches for bracket mounting of the motor. Height is 17⅜ inches. Aluminum blower wheel keeps weight at a minimum.

According to the manufacturer, tests of the new motors show a breakdown torque of 68 ounce-feet, more than ample to supply a central residential air conditioning system operating under maximum load.

More information? Circle Item 57, postcard, last page.

Filter-Sized Electronic Cleaner

An electronic air cleaner no larger than an ordinary furnace filter is currently being marketed by Trion, Inc., McKees Rocks, Pa. Only two inches deep in the direction of air flow, this new model, called Trion DFL, can, in most cases, be installed in the same area presently

occupied by the standard disposable filter.

Several distinct advantages are claimed for the air cleaner. It removes airborne dirt, dust, smoke, pollen and germs from the air and thus becomes a major factor in more healthful living. It is reported to be particularly beneficial to anyone suffering from an allergy.

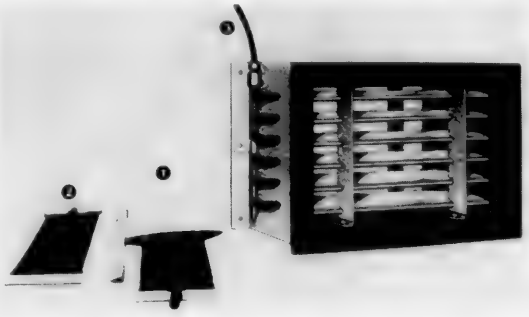
It has a disposable dirt collecting pad that can be readily removed and replaced by a new one. The unit is equipped with a gage that indicates when the dirt collecting pad should be changed. Under normal operating conditions, the pads need not be changed more than three times a year. They may be cleaned by a vacuum sweeper to prolong usability. Two additional pads are included with each unit. The power pack is equipped with a six-foot power cable to permit remote control operation of the unit. Longer cables are available at slight additional cost.

More information? Circle Item 58, postcard, last page.

Motorless Air Valve

Pneumafoil is a high velocity air valve which operates without motors or linkage mechanism of any kind. Offered by Connor Engineering Corp., Danbury, Conn., it is operated by a 15-psi pneumatic control system.

Each of the unit's airfoil type vanes encloses a sealed Neoprene actuator connected to control air. As air pressure is increased, actuators inflate and expand the vanes,



constricting the open area between the vanes and throttling the air flow. When the expanding vanes make contact, complete shutoff with minimal leakage is achieved. Airfoil type vanes minimize noise when throttling, have low pressure drop in full open position, and their aluminum construction prevents corrosion, the company states.

For dual duct applications, two valves are mounted in a mixing box. Valves are fabricated in sixteen sizes which range from 10 by 6 inches to 32 by 24 inches. Mechanical performance of large and small valves is identical. Air capacities range from 1500 to 9600 cfm.

More information? Circle Item 59, postcard, last page.

Heat Pump Control

Paragon Electric Co., Two Rivers, Wis., announces Series 230 heat pump control. Available to manufacturers, it enables accurate and inexpensive defrosting, the company states. Control movement is enclosed in plastic housing. Timing combinations are said to be flexible enough for application on reverse cycle window units for stationary type heat pumps. Timing frequency and defrost cycle length can usually be tailored to customer specifications. A remote control termination feature can be added.

More information? Circle Item 60, postcard, last page.

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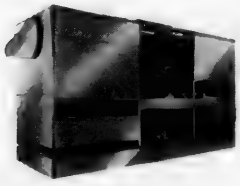
Self-Contained Unit
With Evap. Condenser Type SCU

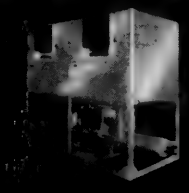
From 11 Basic Models
30 Possible Combinations

Self-Contained Unit
Multi-Zone Type SCMZ



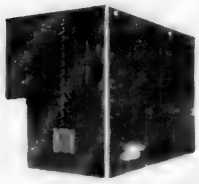
From 11 Basic Models
50 Possible Combinations

Self-Contained Unit
Shell and Tube Type ST



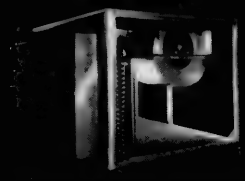
From 13 Basic Models
25 Possible Combinations

Self-Contained Unit
Multi-Zone Type STMZ



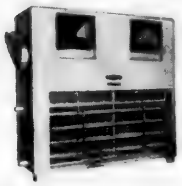
From 13 Basic Models
25 Possible Combinations

Horizontal Air Conditioner
Type GHC



From 14 Basic Models
56 Possible Combinations

Vertical Air Conditioner
Type GVC



From 14 Basic Models
56 Possible Combinations

Multi-Zone Air Conditioner
Type GMZ

From 14 Basic Models
84 Possible Combinations

Evaporative Condensers
Type EC

From 14 Basic Models
28 Possible Combinations

***ChillPak Water Chiller**
Type CPS

From 10 Basic Models
68 Possible Combinations

*Cabinet models available with built-in or remote evaporative condenser.

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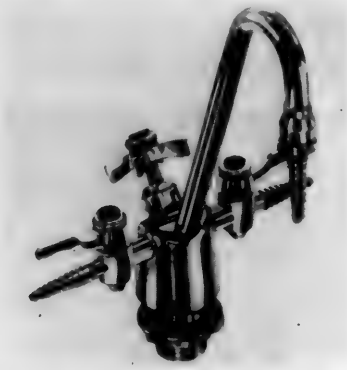
Lab Gas-Water Fixture

Combination laboratory service fixtures normally take on massive proportions to accomplish their multi functions, states T & S Brass and Bronze Works, Inc., Westbury, L. I., N. Y., who has introduced a compact, simplified, heavy duty gooseneck type fixture for combination gas and water service said to provide foolproof operation without crowding work surface areas.

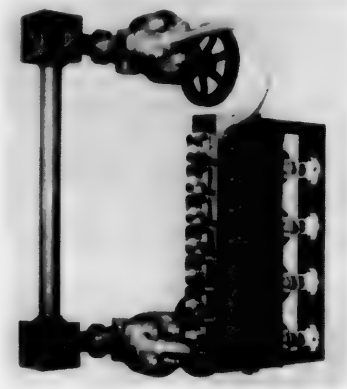


Called Lab-Flo Model BL-6000, unit stands 10½ inches high above the work surface and in its extreme width measures approximately 10 inches. It has ¼-inch IPS female inlets for water and gas, two hose cocks, and a removable ten-serration hose tip on the gooseneck. The shank is 1½ inches in diameter. Color coded plastic indexes are provided for *Gas*, *Air* or *Vacuum*, as specified.

More information? Circle Item 61, postcard, last page.

Color-Indicating Water Level Gage

Yarnall-Waring Co., Philadelphia, Pa., announces a new Yarway Color-Port water level gage for boilers operating at pressure up to 1050 lb WSP. This gage is similar to the high-pressure Yarway Color-Port, but has been redesigned specifically for boiler applications in the medium pressure field.



Design is the individual port type, with cover plate assemblies that can be serviced or replaced in a matter of minutes with the gage in place. Spring loading maintains proper pressure on sealing gasket at all times. Port assemblies are completely interchangeable.

Gage gives brilliant two-color readings. Steam shows red; water shows green. Ranges of visibility available are 13, 15½ and 18 inches. Illuminators give greatest intensity of light in the middle of each port.

More information? Circle Item 62, postcard, last page.

Stainless Steel Strainers

A new line of stainless steel strainers is available from Strong, Carlisle & Hammond, Conneaut, Ohio. Designed to provide reliable service under severe conditions of high temperature, high pressure and corrosion, they may be used as an in-line fitting in steam, liquid, gas and chemical lines.

Type 316 stainless steel is used for body, cap, gasket and screen. Replaceable screens are available with .045, .062, and .125-inch perforations.

Designated as the Strong SSY strainer, it is produced in screwed or socket weld connections for standard pipe sizes from ½ to 2 inches. Maximum non-shock working pressures vary from 650 to 3000 psi over the temperature range from minus 50 to plus 1200 deg. F.

More information? Circle Item 63, postcard, last page.

Ring-Top Refrigerant Cylinders

Ring-top refrigerant cylinders, introduced by Fluorocarbons Division of Union Carbide Chemicals Co., Division of Union Carbide Corp., New York, N. Y., are expected to ease cylinder handling, as well as simplify servicing operations.

Made for packaging Ucon refrigerants exclusively, the design improvement has been applied to 10- and 25-lb cylinders which are usually hand-carried.

New container differs from conventional 10- and 25-lb cylinders in that a cylindrical ring-top steel shield is used for valve protection rather than a cap. Four-inch cut-away sections in the shield form two handles for lifting and carrying the cylinder, as illustrated.

Besides eliminating the need for accessory carrying devices, the design enables the user to place the cylinder in service by simply turning the unit upside down—with the ring-top shield acting as an auxiliary stand. A refrigeration serviceman can hook up flexible tubing to the cylinder and leave it connected until the cylinder is empty. While not in use, the tubing may be wrapped around the valve and nested within the ring-top shield.

More information? Circle Item 64, postcard, last page.

Look Inside...See Why...

FASTER COOLING with more efficient Vertical Air Discharge
30% MORE HUMIDITY REMOVAL with exclusive Cooling Maze Coil
LONGER PEAK PERFORMANCE with gas-cooled, Sealed-In-Steel Compressors
ALL-WEATHER PROTECTION with zinc-coated casing
SAVES 15% ON OPERATING COSTS with automatic twin-system cooling
ULTRA QUIET with ultra-efficient sound isolators

YORK IS THE BLUE CHIP AIR CONDITIONER LINE!

York is Worth More to Customers Who Buy It!

York believes that "price without value" is meaningless... that today's realistic consumer is interested first and foremost in true value and benefits... that delivery of a "full dollar's worth of quality for every dollar of purchase price" is the only foundation on which an enduring business can be built!

York is Worth More to Dealers Who Sell It!

Worth more because York's Blue Chip features are backed by Blue Chip national advertising plus Blue Chip *retail* advertising and *local* promotions! And York offers Blue Chip bonus certificates for buying *and* selling. They're redeemable for valuable merchandise awards or a fabulous York vacation trip!

More Than Ever Your FUTURE and FORTUNE Now Lies With YORK

YORK

BW BORG-WARNER RESEARCH & ENGINEERING MAKE IT BETTER

YORK CORP. SUBSIDIARY OF BORG-WARNER CORP.

Air Conditioning, Heating, Refrigeration and Ice Equipment • Products for Home, Commercial and Industrial Installations

DEGREE-DAYS FOR FEBRUARY, 1959

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING's 31st Year of Publication of Monthly Degree-Day Data

City	February			Season to Feb. 28, incl., from Sept. 1		
	1959	1958	Normal	1958-59	1957-58	Normal
Abilene, Texas (A)	507	590	479	2344	2332	2250
Albany, New York (A)	1249	1286	1179	5404	4883	5056
Albuquerque, New Mexico (A)	705	596	714	3221	3339	3441
Alpena, Michigan (C)	1389	1334	1263	5801	5392	5448
Asheville, North Carolina (C)	635	981	678	3144	3689	3105
Atlanta, Georgia (A)	480	756	512	2257	2695	2269
Atlantic City, New Jersey (A)	852	971	829	3891	3357	3331
Augusta, Georgia (A)	380	657	412	2032	2395	1768
Baltimore, Maryland (C)	738	891	776	3366	3147	3193
Billings, Montana (A)	1200	1073	1089	5027	4569	5133
Binghamton, New York (C)	1112	1244	1100	5088	4719	4735
Birmingham, Alabama (A)	466	762	491	2299	2655	2252
Bismarck, North Dakota (A)	1645	1515	1464	6966	6097	6652
Block Island, Rhode Island (A)	988	1058	955	4098	3620	3917
Boise, Idaho (A)	771	632	868	3714	3989	4377
Boston, Massachusetts (A)	1065	1102	1002	4390	3817	4123
Buffalo, New York (A)	1134	1242	1128	4976	4716	4777
Burlington, Iowa (A)	1069	1326	1036	4863	4836	4641
Burlington, Vermont (A)	1430	1456	1313	6056	5388	5632
Cairo, Illinois (C)	696	952	683	3184	3248	3004
Charleston, South Carolina (C)	313	592	363	1521	1894	1466
Charlotte, North Carolina (A)	528	783	757	2563	2870	2555
Chattanooga, Tennessee (A)	580	865	588	2813	3115	2693
Cheyenne, Wyoming (A)	1086	891	1044	4851	4781	5109
Chicago, Illinois (A)	1083	1253	1053	4816	4608	4648
Cincinnati, Ohio (C)	753	1015	812	3540	3610	3465
Cleveland, Ohio (A)	998	1164	1019	4557	4348	4322
Columbia, Missouri (A)	861	1122	876	3960	4043	3934
Columbia, South Carolina (A)	412	671	443	2144	2430	1889
Columbus, Ohio (C)	868	1102	907	4255	4115	3953
Concord, New Hampshire (A)	1280	1271	1226	5629	4893	5457
Concordia, Kansas (C)	980	1084	899	4196	4109	4091
Dallas, Texas (A)	443	561	432	2044	2006	1909
Dayton, Ohio (A)	(a)	1155	941	(a)	4383	4157
Denver, Colorado (A)	968	765	924	4119	3932	4397
Des Moines, Iowa (A)	1148	1341	1092	5020	5036	4877
Detroit, Michigan (A)	(a)	1173	1072	(a)	4582	4600
Devils Lake, North Dakota (C)	1669	1586	1576	7485	6689	7237
Dodge City, Kansas (A)	871	936	840	3974	3780	3867
Dubuque, Iowa (A)	1327	1383	1187	5732	5467	5366
Duluth, Minnesota (C)	1543	1518	1448	7240	6616	6677
Elkins, West Virginia (A)	881	1194	910	4467	4643	4182
El Paso, Texas (A)	434	370	445	1885	2220	2201
Ely, Nevada (A)	1085	863	1033	4821	5057	5199
Escanaba, Michigan (C)	1441	1353	1327	6171	5657	5856
Evansville, Indiana (A)	768	1073	770	3743	3793	3424
Fargo, North Dakota (A)	1555	1471	1518	6864	6200	6851
Fort Smith, Arkansas (A)	607	750	571	2812	2777	2619
Fort Wayne, Indiana (A)	1029	1200	1036	4888	4707	4601
Fort Worth, Texas (A)	452	592	446	2130	2163	1958
Fresno, California (A)	422	309	400	1716	1946	2040
Galveston, Texas (C)	260	379	247	1154	1149	1005
Grand Junction, Colorado (A)	814	693	924	3875	4058	4488
Grand Rapids, Michigan (A)	1187	1248	1154	5269	5076	5033
Green Bay, Wisconsin (A)	1466	1399	1336	6237	5794	5887
Greensboro, North Carolina (A)	632	882	672	3102	3345	2991
Greenville, South Carolina (A)	529	777	552	2438	2882	2425
Harrisburg, Pennsylvania (A)	904	1065	921	4170	4035	3943
Hartford, Connecticut (A)	1090	1153	1050	4819	4381	4494
Havre, Montana (C)	1596	1385	1291	6349	5289	6044
Helena, Montana (A)	1405	1113	1165	5867	5218	5881
Houston, Texas (C)	254	397	240	798	1254	1083
Huron, South Dakota (A)	1525	1378	1327	6201	5434	5927
Indianapolis, Indiana (A)	925	1150	938	4456	4400	4201
Jackson, Mississippi (A)	396	682	405	2050	2305	1822
Kansas City, Missouri (A)	856	1053	851	3715	3838	3811
Knoxville, Tennessee (A)	589	920	630	2875	3185	2844
La Crosse, Wisconsin (A)	1417	1360	1280	5911	5504	5708
Lander, Wyoming (A)	1228	893	1179	5463	5303	5982
Lewiston, Maine (O)	(a)	1260	1243	(a)	4956	5532

(a) Data not available.

Normal figures in this table are based on 30-year period covering 1921 to 1950, inclusive, as compiled and published by the U. S. Weather Bureau.

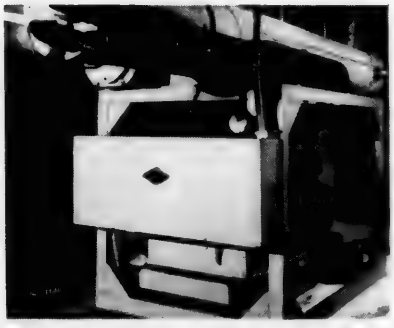
Figures in this table, with two exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively. [Table concluded on page 132]

ANOTHER NATIONAL-U.S. SUCCESS STORY

NEW MOTOR LODGE HAS THREE-WAY TEMPERATURE CONTROLS FOR GUEST UNITS

Lobby of the new Howard Johnson Motor Lodge shows air conditioning outlets above passageway.

National-U.S. Supplies Hydronic Heating, Air Conditioning.



This is one of the two packaged water chillers that cool the Howard Johnson Motor Lodge.

Bedford, Pa.:—A new motor lodge, one of the first to be built to Howard Johnson's architectural design and specifications, is now open at the Breezewood Interchange of the Pennsylvania Turnpike, about 20 miles east of here. It is owned and operated by George R. Bortz and B. G. Studebaker, of this city, and features individual temperature control for each of the fifty units in the plan.

Each unit has a fan-coil distributor which blows air over a metal coil through which either hot water or a refrigerant can be circulated. And for supplementary heat, each bathroom has National-U. S. baseboard heating. Result is complete flexibility for selecting any desired temperature condition, winter or summer.

Main source of heat is a National-U. S. oil-fired "47" Series boiler. For cooling, a 15-ton and a 20-ton Capitol-aire Water Chiller, with companion 20 ton cooling tower was provided. And an assured supply of hot water for showers, faucet use and laundry is provided by two National-U. S. 060 Deepfire Hot Water Supply Boilers. One is primarily for stand-by use. Complete installation was the work of R. E. Hollis, Bedford plumbing and heating contractor.

These two boilers are made by National-U.S. especially to give plenty of faucet hot water.

All fifty motel units plus office and administrative space are kept comfortably warm with this large National-U.S. "47" Series Oil Fired Boiler.

For full information on all National-U.S. heating or air conditioning products, see our listing in the Yellow Pages of your phone book, or write:

National-U.S. Radiator CORPORATION
HEATING AND AIR CONDITIONING DIVISION
Johnstown, Pennsylvania

Degree-Days for February, 1959 (Concluded)

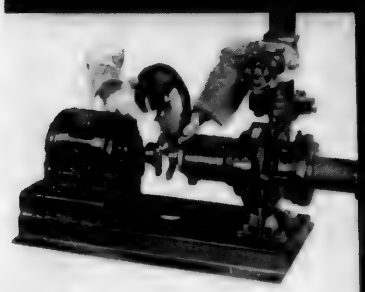
(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING's 31st Year of Publication of Monthly Degree-Day Data

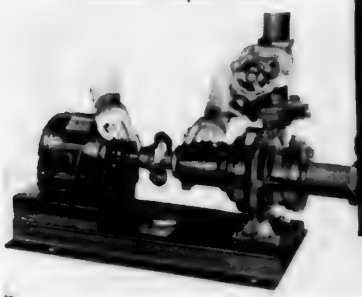
City	February			Season to Feb. 28, incl., from Sept. 1		
	1959	1958	Normal	1958-59	1957-58	Normal
Lincoln, Nebraska (C)	1071	1137	1000	4443	4406	4483
Little Rock, Arkansas (A)	550	725	543	2520	2507	2441
Los Angeles, California (C)	237	130	244	606	549	1023
Louisville, Kentucky (A)	723	1041	778	3508	3667	3444
Lynchburg, Virginia (A)	683	930	722	3282	3545	3193
Macon, Georgia (A)	376	621	391	1782	2166	1712
Madison, Wisconsin (A)	1357	1339	1207	5862	5456	5331
Marquette, Michigan (C)	1378	1352	1291	5990	5570	5737
Memphis, Tennessee (A)	570	862	574	2639	2836	2547
Meridian, Mississippi (A)	389	676	413	2133	2338	1930
Milwaukee, Wisconsin (A)	1273	1346	1142	5545	5307	5089
Minneapolis, Minnesota (A)	1334	1383	1310	5888	5567	5862
Moline, Illinois (A)	1096	1345	1075	5005	5056	4797
Montgomery, Alabama (A)	363	659	288	1779	2205	1769
Nashville, Tennessee (A)	634	950	636	3004	3248	2786
New Haven, Connecticut (A)	1034	1096	1005	4437	4045	4263
New Orleans, Louisiana (C)	230	448	223	1128	1349	993
New York, New York (C)	917	1035	904	3848	3577	3670
Newark, New Jersey	928	1036	932	3947	3695	3883
Norfolk, Virginia (A)	591	796	644	2644	2758	2630
North Platte, Nebraska (A)	1137	1106	1016	4988	4716	4851
Oak Ridge, Tennessee (C)	611	897	689	3044	3169	3110
Oakland, California (A)	385	265	400	1512	1658	2029
Oklahoma City, Oklahoma (A)	687	818	630	3131	3090	2840
Omaha, Nebraska (A)	1114	1250	1058	4731	4675	4728
Parkersburg, West Virginia (C)	788	1063	826	3894	3941	3599
Peoria, Illinois (A)	1057	1271	1028	4786	4689	4580
Philadelphia, Pennsylvania (C)	782	989	837	3596	3447	3394
Phoenix, Arizona (A)	306	191	275	1046	1124	1255
Pittsburgh, Pennsylvania (C)	835	1082	879	4046	3990	3761
Pittsfield, Massachusetts (A)	1243	1326	1212	5639	5197	5415
Pocatello, Idaho (A)	952	778	1022	4457	4861	5082
Portland, Maine (A)	1305	1283	1218	5684	4825	5367
Portland, Oregon (C)	600	451	594	2616	2510	2985
Providence, Rhode Island (A)	1063	1124	1019	4541	4035	4339
Pueblo, Colorado (A)	871	752	865	4002	3781	4248
Raleigh, North Carolina (A)	591	819	577	2837	3061	2434
Rapid City, South Dakota (A)	1206	1201	1151	5113	4762	5314
Reading, Pennsylvania (C)	903	1037	902	4018	3810	3785
Red Bluff, California (A)	420	353	423	1605	2113	1982
Reno, Nevada (A)	867	658	804	3895	4034	4190
Richmond, Virginia (A)	650	871	708	3115	3282	3068
Rochester, New York (A)	1182	1269	1148	5120	4841	4870
Roswell, New Mexico (A)	594	552	566	2862	2823	2768
Sacramento, California (C)	405	286	403	1512	1884	1997
St. Joseph, Missouri (A)	981	1182	820	4307	4373	3646
St. Louis, Missouri (C)	777	1074	792	3615	3682	3478
Salt Lake City, Utah (A)	804	649	885	3841	4084	4358
San Antonio, Texas (A)	311	419	293	1505	1505	1355
San Diego, California (A)	216	117	247	574	538	1042
Sandusky, Ohio (C)	1008	1173	997	4594	4425	4235
San Francisco, California (C)	315	242	336	1228	1404	1679
Sault Ste. Marie, Michigan (A)	1543	1499	1442	6625	6052	6369
Savannah, Georgia (A)	285	584	330	1567	1989	1429
Scranton, Pennsylvania (A)	1095	1225	1028	4985	4716	4423
Seattle, Washington (C)	597	413	602	2765	2492	3037
Sheridan, Wyoming (A)	1270	1079	1170	5510	4894	5607
Shreveport, Louisiana (A)	402	565	386	1978	1990	1784
Sioux City, Iowa (A)	1261	1314	1170	5312	5036	5301
Spokane, Washington (A)	960	697	988	4621	4230	4936
Springfield, Illinois (A)	961	1170	907	4394	4348	4021
Springfield, Missouri (A)	763	1011	790	3630	3667	3624
Syracuse, New York (A)	1201	1266	1117	5233	4833	4682
Toledo, Ohio (A)	1064	1193	1056	4942	4703	4617
Topeka, Kansas (C)	926	1037	851	4115	3883	3830
Trenton, New Jersey (C)	907	1024	904	3962	3709	3760
Tulsa, Oklahoma (A)	652	834	644	2974	2964	2882
Utica, New York (O)	(a)	1257	1181	(a)	4913	4966
Valentine, Nebraska (A)	1263	1245	1100	5378	4994	5170
Walla Walla, Washington (C)	727	494	748	3416	3117	3737
Washington, D. C. (C)	722	944	770	3314	3420	3258
Wichita, Kansas (A)	870	982	778	3772	3715	3564
Williston, North Dakota (C)	1653	1407	1442	6848	5861	6642
Winnemucca, Nevada (A)	941	670	854	4217	4390	4602
Yakima, Washington (A)	835	615	862	4311	3901	4512

For footnotes, see page 130.

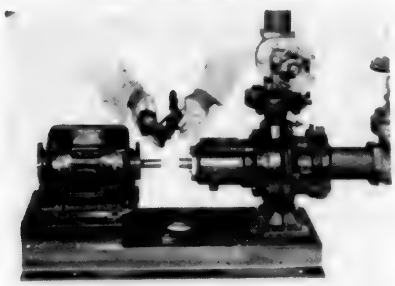
EASY TO SERVICE
. . . no pipes to disconnect



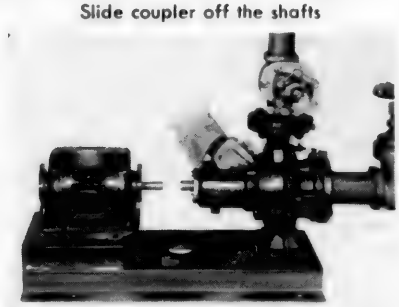
Remove coupler shield



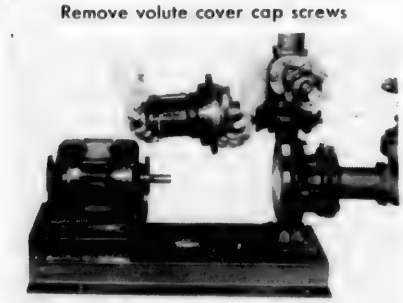
Loosen coupler set screws



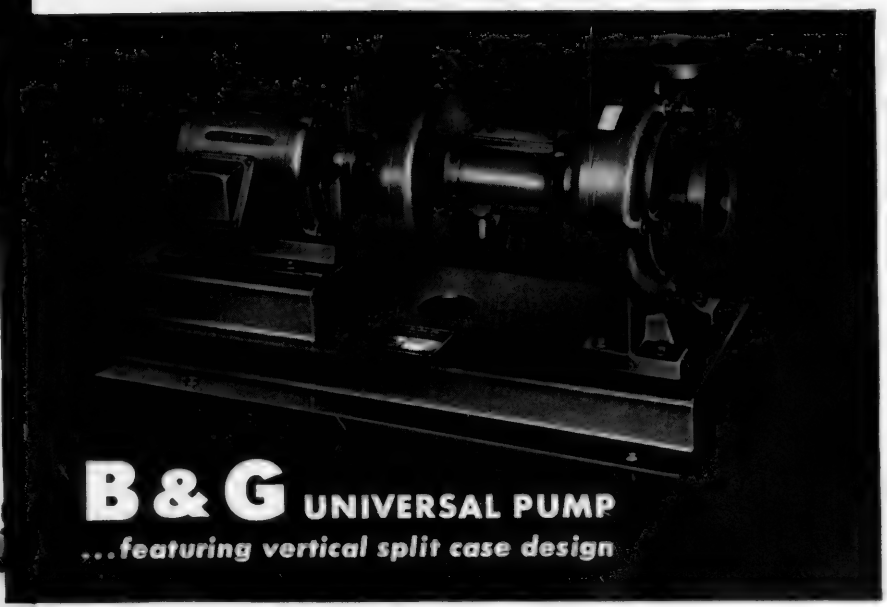
Slide coupler off the shafts



Remove volute cover cap screws



Lift out entire bearing frame and impeller



B & G UNIVERSAL PUMP

...featuring vertical split case design

DESIGNED FOR
WHISPER-QUIET
VIBRATIONLESS OPERATION

No feature is so important in a circulated water heating or cooling system pump as *quiet operation!* Transmission of pump noise through the piping can ruin the most carefully installed system.

B&G Universal Pumps meet this challenge. They are engineered and built to satisfy in every detail the exacting demands of circulated water heating and cooling systems...distinguished by numerous features which assure silent, vibrationless operation.

Universal Pump motors, for example, are specially constructed and selected for *extra-quiet* operation. Long *sleeve* bearings are used in both motor and pump—another assurance of silent, vibrationless operation and long life of both pump and motor. The oversized shaft is made of special alloy steel, with an integral, heat-treated thrust collar to absorb end-thrust. Water leakage is prevented by the diamond-hard "Remite" mechanical seal...a B&G development.

Note, too, how *vertical* split case construction with removable bearing frame permits easy servicing without breaking pipe connections.

"PD" BOOSTER
Largest in-line Booster

B & G BOOSTER

B&G Booster pumps are in-line units with the same features which distinguish the Universal Pump. *Nearly 3,000,000 have been installed!*

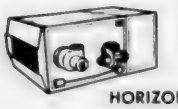
Reg. U.S. Pat. Off.

BELL & GOSSETT
COMPANY
Dept. FR-4, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

a STRONGER heart of stainless in MAXI-THERM

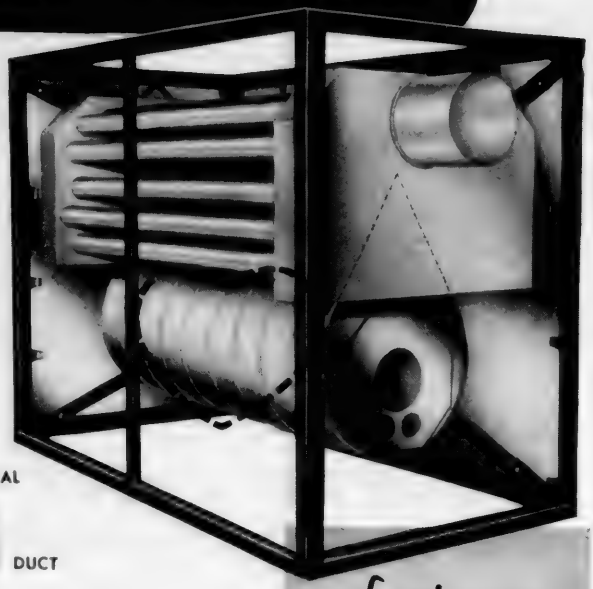
UP FLOW

COUNTER FLOW



HORIZONTAL

DUCT



One important example of MAXI-THERM'S dedication to quality is their pioneering leadership in applying the new, costlier No. 442 stainless steel to combustion chamber construction.

In addition to being superior, this stainless is used in a heavier gauge, as well, to assure the durable chamber required for MAXI-THERM'S high BTU output for industrial and commercial applications. The chamber is also teardropped and ribbed for long life and efficiency. Conveniently tabulated at right are some other hidden pluses found in all four models in the MAXI-THERM line.

Available in standard capacities from 120,000 to 2,500,000 BTU's. Refractory lined series to 2,000,000 BTU's. Larger specials cooperatively engineered.

Write for specification details or representation information

features

- No. 442 stainless two-pass combustion chamber.
- Two-pass aluminized steel exchanger provides a four-pass system.
- Quint-Angle one-piece welded 12-gauge frame construction.
- Polished radiant shield.
- Tube and transfer box access plate.
- Field flexibility from interchangeability of Up Flow, Counter Flow and Horizontal Models.
- Oil and/or gas fired, single or dual fuel.
- Firing equipment, all fuels, U.L. and A.G.A. inspected and approved.
- Available with duct flange connections or four-way adjustable diffuser heads and screened intakes.

CSF **Chicago Steel Furnace Co.**

9324 S. Anthony Ave. • Chicago 17, Illinois

NEW CATALOGS

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

WATER HEATING WITH STEAM — Bell & Gossett Co., Morton Grove, Ill., offers two bulletins containing specifications and installation information on heating radiation water and domestic water with steam. Bulletin No. SC-159, on Type SU converters for heating radiation water with steam, contains rating charts for most commonly required temperature rises through a wide range of steam pressures. Ratings are given for heating radiation, radiant panels, and snow melting. Heating domestic water with steam, using Type SU instantaneous water heaters, is described in Bulletin No. S1-159. Ratings are given for service and feed water heaters, and for swimming pool heaters.

Circle **Item 65** on Inquiry Card

BURNER CONTROL SYSTEMS — Available from Iron Fireman Manufacturing Co., Cleveland, Ohio, is a detailed folder on pre-wired, pre-tested panel control systems for automatic oil, gas, or dual-fuel burners in commercial and industrial boiler instalations. Included in Folder No. 5803-A are dimensions, illustrations, advantages, and selection data for easy specification of panel assemblies.

Circle **Item 66** on Inquiry Card

MOTOR CONTROL SELECTION — A Quick Selector Chart, designed to simplify and speed the selection and ordering of motor controls, is announced by The Arrow-Hart & Hegeman Electric Co., Hartford, Conn. Chart is hole-punched at the top so that it may be conveniently located on the wall for quick reference. Index tabs make it easy to locate the motor control information in which the user is interested.

Circle **Item 67** on Inquiry Card

VIBRATION CONTROL—Data on control of noise and vibration transmission from air conditioning equipment through proper mounting are clearly outlined in Bulletin VAC-12 published by Vibration Mountings, Inc., Corona, N. Y. Included is a helpful selection guide cross-indexed according to type of equipment and its location in critical or non-critical areas. Data on such subjects as recommended minimum vibration isolation efficiencies and theoretical material isolation efficiencies based on rpm are also charted for quick reference.

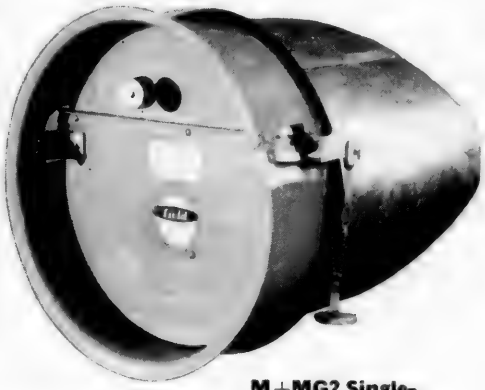
Circle **Item 68** on Inquiry Card

(Continued on page 137)

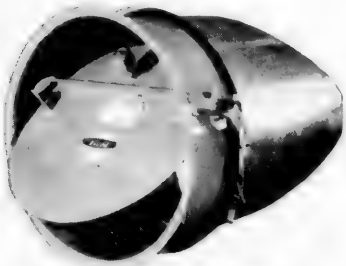
The Triple-Fuel M+MG2

Joins the Field Family of Draft Controls

M+MG2 Barochek for Solid Fuels



M+MG2 Single-Acting for Oil



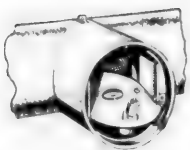
M+MG2 Double-Acting for Gas or Oil-Gas

A new triple fuel control, the M+MG2 is available in 10″ through 32″ sizes for oil, oil-gas, gas,and solid fuel furnaces and boilers, employing either natural, induced or forced draft. A very heavy duty, highly sensitive control, it can maintain draft settings as low as .002″ and as high as .3″. Write for application engineering data.

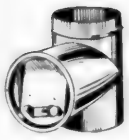
field **FIELD CONTROL DIVISION** H. D. Conkey & Company, Mendota, Ill.

AFFILIATES { Conco Building Products, Inc. • Brick, Tile, Stone
Conco Materials Handling Div. • Cranes, Hoists

Represented in Canada by Ontor Limited, 12 Leswyn Road Toronto 10, Ont., Canada

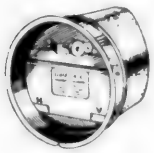


Field M 6″ thru 9″



Field R 6″ and 6-7″

Field 6″ Incinerator Control



Field RC 6″ thru 9″

Field Scotty 6″ and 6-7″

Field MG1 7″ and 8″

How to Harness High Velocity Air

. . . facts about the selection of control units for efficient design, constant cfm delivery, and simplified stabilization of a system

Design and balancing of high velocity systems are greatly simplified by correct selection of currently available air control units. Three basic types meet all requirements: 1. *air valves;* 2. *constant volume regulators;* 3. *double-duct control units combining valves and regulator.*

These controls can be used independently or in combination, their application depending upon available duct space, noise control, balancing requirements, and other variables.

Air Valves. Manual or motor-operated valves throttle air flow for: 1. reducing velocity in single- or double-duct systems; 2. controlling double-duct hot and cold air mixing; 3. balancing low velocity ducts or take-offs. Air valves cannot provide constant cfm delivery when there is variation in static pressure in the system.

Model F valves operate very quietly when handling high velocity inlet air. They can be mounted directly behind Uni-Flo diffusers when moderate noise level is permissible in the occupancy zone. When Model R valves are used to handle high velocity inlet air, acoustical lining is required downstream from the valve.

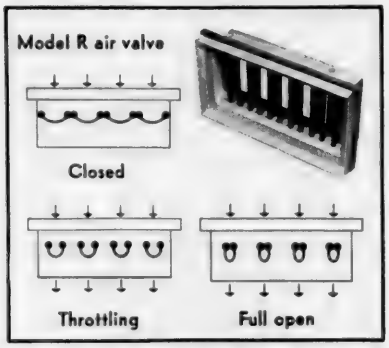


Fig. 1 — Motor-operated valves are widely used in double-duct systems for mixing of hot and cold air. Manually operated valves are used in branch ducts or take-offs to reduce velocity and/or balance the system.

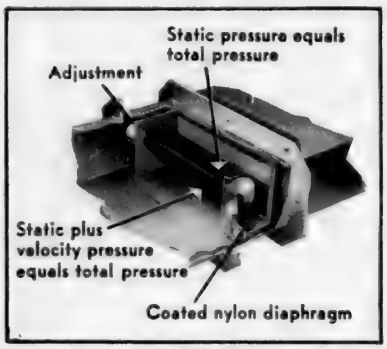

Static pressure equals total pressure
Adjustment
Static plus velocity pressure equals total pressure
Coated nylon diaphragm

Fig. 2 — SCR volume regulator maintains constant cfm delivery for inlet air pressure differences up to 6:1. No power source required, the regulator operating on as little as 0.50 inches static pressure.

Constant Volume Regulators. New Barber-Colman SCR constant volume regulators maintain constant cfm delivery regardless of static pressure changes in the system. Operation is illustrated in Figure 2. A static pressure increase or decrease above the diaphragm forces it downward or upward, controlling the open area of the baffle plate. Acoustic lining insures quiet operation.

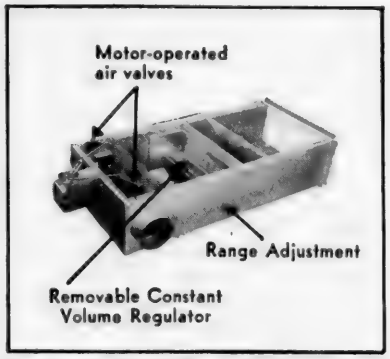


Fig. 3 — Model CV double-duct control unit combines two motor-operated valves (Fig. 1) and a constant volume regulator (Fig. 2) to provide accurate temperature control, velocity reduction, and constant cfm delivery.

SCR units greatly simplify design and stabilization. When they are used in branch ducts, the system becomes *self-balancing.* (Fig. 5)

Double-Duct Control Units. Another boon to designers and installers is the Barber-Colman Model CV Control (Fig. 3) — two motor-operated air valves and a constant volume regulator in one compact unit. Model CV accurately mixes hot and cold air and delivers constant cfm at reduced velocity. Acoustic lining provides quiet operation.

Send for new bulletin. Valuable high velocity system design data is contained in new Bulletin No. F6598-1 available upon request. Call your local Barber-Colman field office or write:

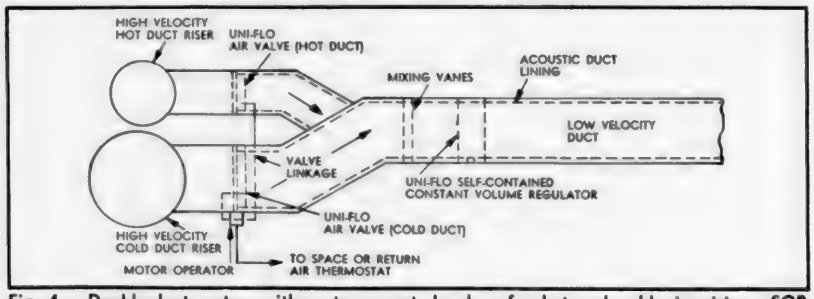


Fig. 4 — Double-duct system with motor-operated valves for hot and cold air mixing. SCR regulator maintains constant cfm delivery to the low velocity duct. NOTE: Model CV unit (Fig. 3) could be used instead of the two valves and SCR regulator.

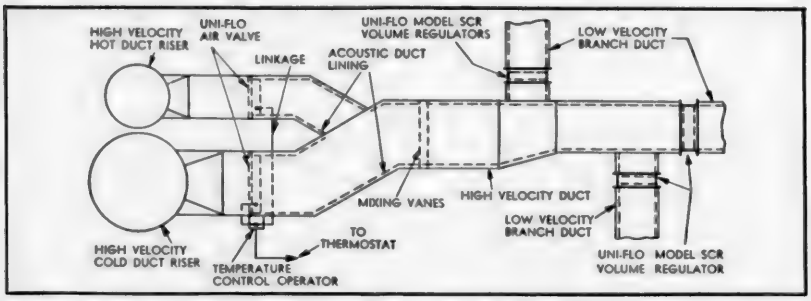


Fig. 5 — Double-duct high velocity system with Model R air valves controlling mixture of hot and cold air. Constant volume regulators in branch ducts make the system self-balancing.

BARBER COLMAN ®

BARBER-COLMAN COMPANY

Dept. P,1102 Rock Street, Rockford, Illinois

NEW CATALOGS

(Continued from page 134)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

PLASTIC PIPE AND FITTINGS—A catalog, No. 10050-A, on its line of rigid polyvinyl chloride piping, fittings and valves, covering both normal and high impact material, is announced by Plastic Products Div., B. F. Goodrich Industrial Products Co., Marietta, Ohio. Catalog lists complete specifications and physical properties of Koroseal piping, and includes data about common chemicals that can be safely handled.

Circle **Item 69** on Inquiry Card

COMMERCIAL REGISTERS, GRILLES — Air Control Products, Inc., Coopersville, Mich., offers a 20-page catalog, 59 C.R., describing its complete line of commercial registers and grilles. The No. 120 low-cost commercial series, featuring multi-louver valve and one-piece face construction, is included in the catalog along with the Multi-Trol series. Large product illustrations, complete engineering details, and specifications are provided.

Circle **Item 70** on Inquiry Card

AVIATION HANGAR HEATING—A 20-page illustrated bulletin, No. HA-100, describes aviation hangar heating installations utilizing overhead revolving discharge heaters. Published by L. J. Wing Mfg. Co., Linden, N. J., the bulletin discusses problems and solutions in hangar heating, shows typical installations, and provides typical layouts and engineering data.

Circle **Item 71** on Inquiry Card

PACKAGED HOT WATER BOILER—An 8-page publication, available from Orr & Sembower, Inc., Reading, Pa., describes its new hot water heating boiler which is built in 18 sizes from 500,000 to 20,000,000 Btu per hr. The Powermaster boiler is designed especially for forced circulation hot water systems for institutional, commercial and industrial space heating. Curves, tables, charts and photographs are included in Bulletin 1251.

Circle **Item 72** on Inquiry Card

SPUN ROOF VENTILATORS—The Peerless Electric Co., Warren, Ohio, announces a bulletin on the firm's new line of spun roof ventilators. Bulletin No. 246 contains performance tables, applications, general construction features, optional features, ratings, and motor construction.

Circle **Item 73** on Inquiry Card

FIRE CONTROL SYSTEMS—The Fyr-Fyter Co., Dayton, Ohio, has issued a 28-page brochure covering its nine major brands of interior fire extinguishing systems, portable extinguishers, cabinets, and other "inside" fire control products. Every type of modern interior fire control system—automatic sprinkler, carbon dioxide, dry chemical, foam and smoke detection—is described and illustrated in the brochure. Details on hose and extinguisher "wall mounted" and "recessed" cabinets; a review of all latest-style extinguisher models; data on hose nozzles, valves and connections; and facts on other important fire control accessories are provided.

Circle **Item 74** on Inquiry Card

SUMP PUMPS—New literature is announced by Weil Pump Co., Chicago, Ill. First is Bulletin SS 805D giving construction and application data on the company's Model SS 805 sump pump. The second booklet is an 8-page pamphlet, entitled The Truth About Sump Pumps, which discusses these pumps on an unbiased non-brand basis, listing the important features to consider in selecting a sump pump.

Circle **Item 75** on Inquiry Card

SOAP DISPENSERS, VALVES—An extremely broad array of soap dispensers and valves—in both liquid and lather types—is included in the 20-page catalog on Watrous dispensers published by The Imperial Brass Mfg. Co., Chicago, Ill. Wall mounted and lavatory mounted dispensers, liquid and lather soap valves, soap tanks, fittings and valves are included in Catalog No. 472. A special section gives technical data on typical gravity feed soap systems.

Circle **Item 76** on Inquiry Card

FUEL OIL HEATERS—An 8-page bulletin, No. 585, gives complete specifications and description of fuel oil heaters manufactured by Brown Fintube Co., Elyria, Ohio. They are used on the suction side of pumps for heating extremely viscous fluids, such as Bunker C fuel oils and asphalt, in order to reduce their viscosities so that they can be more readily pumped. Included are (1) the tank suction type heater which is installed on the tank with the open end of the heater extending into the tank, and (2) the line type heater which is mounted entirely outside the tank in the pipeline.

Circle **Item 77** on Inquiry Card

HYDRAULIC EXCAVATORS — Badger Div., The Warner & Swasey Co., Winona, Minn., offers an illustrated catalog showing its new Model 500 TM, 200 SPR, and 200 SPC hydraulic excavators, plus the complete line of attachments for all Hopto backhoes. On-the-job pictures of these machines at work show the wide variety of digging and material handling jobs of which they are capable.

Circle **Item 78** on Inquiry Card

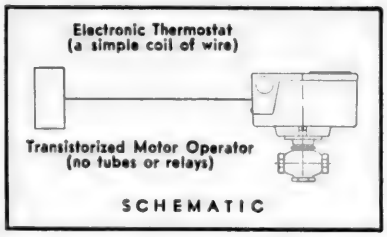
NOW...

Electronic Control at no extra cost!

...new transistorized motor operator for proportional control!

The transistor operator is an electronically controlled device containing a transistorized amplifier and an operating mechanism for proportional operation of a valve (as shown) or damper.

Virtually self-contained, the attachment of a two-wire sensing element forms a complete elec-



tronic control system (see schematic). Wide choice of sensing elements.

Compactness, simplicity, and moderate cost are achieved through the use of transistors and electronic circuitry. This means superior performance and low maintenance.

Spring-return action provides fail-safe performance.

Ask for Brochure F8991

BARBER COLMAN **Automatic Controls**

"Better Control... Electrically"

BARBER-COLMAN COMPANY
Dept. P, 1302 Rock Street, Rockford, Illinois
Field Offices in Principal Cities

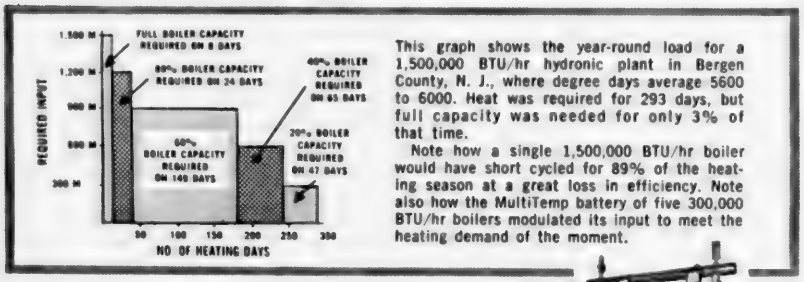
HYDROTHERM

PACKS A 20% GAS SAVING HERE
Here's where MultiTemp reduces gas costs by 20%. Return header has independent, differentially set aquastats that trigger each boiler, modulate input, and eliminate short cycling waste.

New MULTITEMP SYSTEMS
Make Gas Heat Competitive on "BIG JOBS"

Now even the big jobs requiring up to 3,600,000 BTU/hr input can enjoy the convenience and cleanliness of gas heat. A Hydrotherm MultiTemp system achieves true input modulation, brings gas consumption down and, being composed of multiple units, insures against service interruptions.

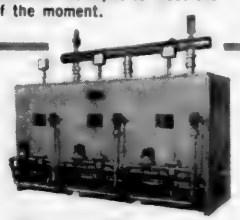
A MultiTemp battery of Hydrotherm boilers is hooked up with a separate aquastat for each boiler in the common return header. With each aquastat set for a different temperature, the boilers are fired or cut off independently. When the demand is small, only one boiler operates...when it is great or when the system is making a cold start, the complete heating plant is fired.



This graph shows the year-round load for a 1,500,000 BTU/hr hydronic plant in Bergen County, N. J., where degree days average 5600 to 6000. Heat was required for 293 days, but full capacity was needed for only 3% of that time.

Note how a single 1,500,000 BTU/hr boiler would have short cycled for 89% of the heating season at a great loss in efficiency. Note also how the MultiTemp battery of five 300,000 BTU/hr boilers modulated its input to meet the heating demand of the moment.

- *Input Ratings from 360,000 to 3,600,000 BTU/hr*
- *100 lbs. ASME Working Pressure*
- *Boilers Shipped Pre-Wired and Assembled*
- *Units Pass Thru 2'6" Doors*
- *Ideal for Volume Hot Water*



Write today for MultiTemp Catalog

HYDROTHERM INC

Dept. 13-AH NORTHVALE, NEW JERSEY

OTHER FAMOUS HYDROTHERM PRODUCTS: HydroTherm • HydroVector • HydroChiller • HydroFin

NEW CATALOGS

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

EXPANSION JOINT SELECTION—A 4-page bulletin published by Zallea Brothers, Wilmington, Del., describes the company's complete line of packless corrugated expansion joints. In addition, this condensed bulletin provides a convenient guide to expansion joint selection. Application data aid in selection by explaining where each type of expansion joint is used, pointing out their advantages and limitations in various services.

Circle **Item 79** on Inquiry Card

INDUSTRIAL INCINERATORS — A new folder from Winnen Incinerator Co., Bedford, Ohio, illustrates, describes, and gives complete specifications for the company's complete line of stationary and portable heavy-duty incinerators in a wide range of standard sizes. Optional equipment for the Wincinators is included.

Circle **Item 80** on Inquiry Card

INSTANTANEOUS HEATERS — Bulletin 304.4K1, presenting new Ross instantaneous heaters with extra-large steam inlet area, is offered by Industrial Div., American-Standard, Detroit, Mich. Seventeen pages of selection tables, charts, and piping diagrams are provided to assist engineers in selecting the proper units to meet various requirements.

Circle **Item 81** on Inquiry Card

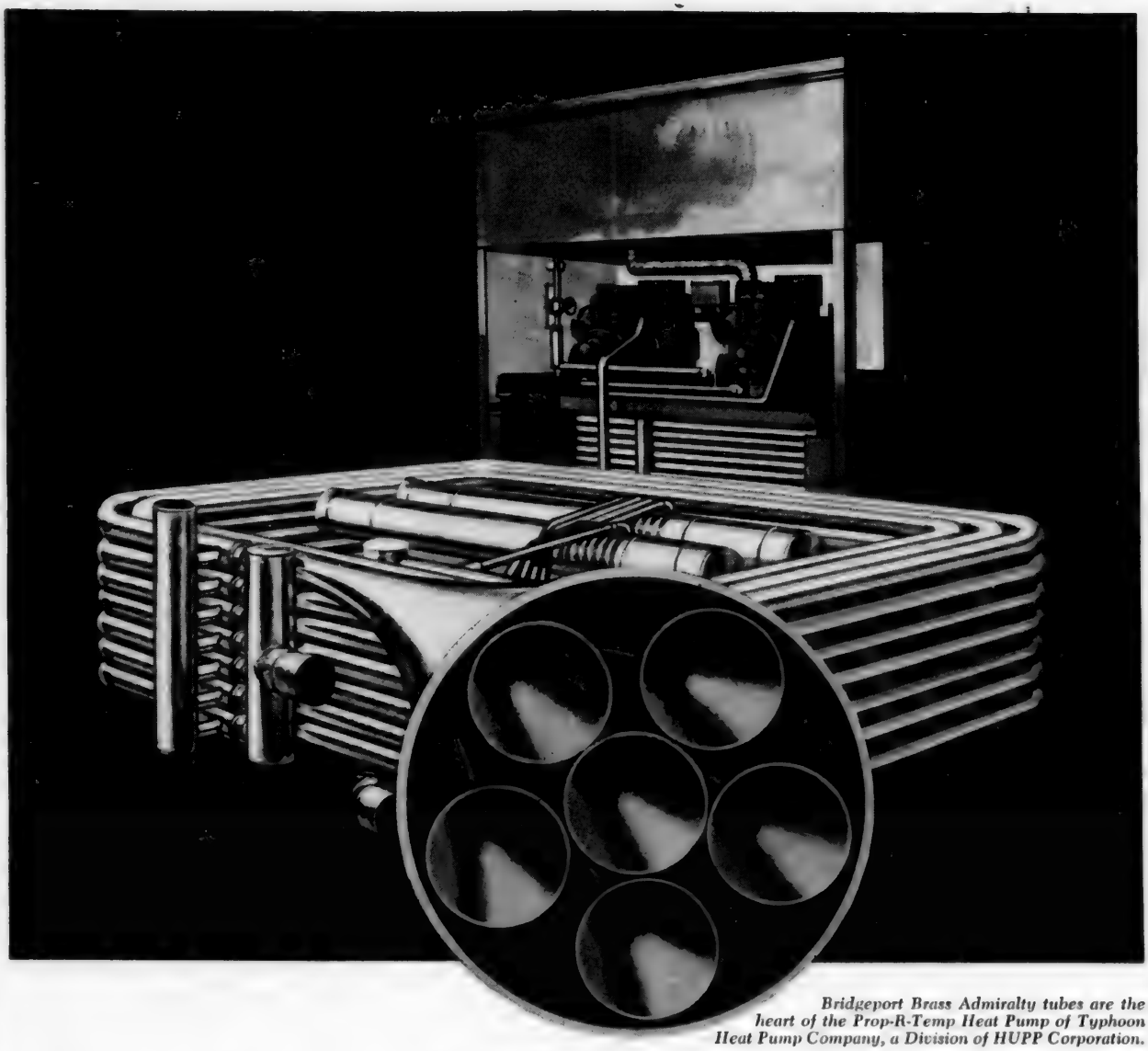
NOISE CONTROL PRODUCTS — The modern trend toward noise control has been reflected in the publication by Owens-Corning Fiberglas Corp., Toledo, Ohio, of literature on acoustical products. A 30-page booklet, entitled Fiberglas Noise Control Products (AC-43C), contains selection guide, application data and specifications, installation techniques, and general information concerning the Fiberglas line of acoustical products.

Circle **Item 82** on Inquiry Card

DUCTILE IRON PRODUCTS—A 36-page illustrated catalog describes the complete line of American ductile iron products manufactured by American Cast Iron Pipe Co., Birmingham, Ala., for super-service conditions. Catalog gives valuable technical information including grades, specifications, dimensions and weights, uses and applications. Typical applications include underground piping, industrial piping, and well casing.

Circle **Item 83** on Inquiry Card

(Continued on page 140)



Bridgeport Brass Admiralty tubes are the heart of the Prop-R-Temp Heat Pump of Typhoon Heat Pump Company, a Division of HUPP Corporation.

HEAT PUMPS PROVE THE DEPENDABILITY OF

This remarkable Prop-R-Temp Heat Pump, a product of Typhoon Heat Pump Company , Tampa, Florida, heats, cools and dehumidifies. A key part of this unit is the tube-in-tube condenser coil which transfers heat from water to refrigerant, or reverse. This unique circular or rectangular coil consists of six ⅝" O D Bridgeport Admiralty tubes nestled inside a larger, 1⅜" O D Admiralty tube. The six smaller tubes are inserted into a straight length of larger tube and then coiled or bent on blocks of various radii. This fabricating method requires closely controlled physical properties of tube to avoid distortion. The length and number of coils—whatever their size—is subjected to a test of 1,000 lbs. pressure before being accepted for application.

Years ago, trouble was frequently experienced due to copper tube failure or excessive scaling caused by highly corrosive waters in certain localities. This failure was costly since,when it occurred, it was necessary to replace the entire condenser.

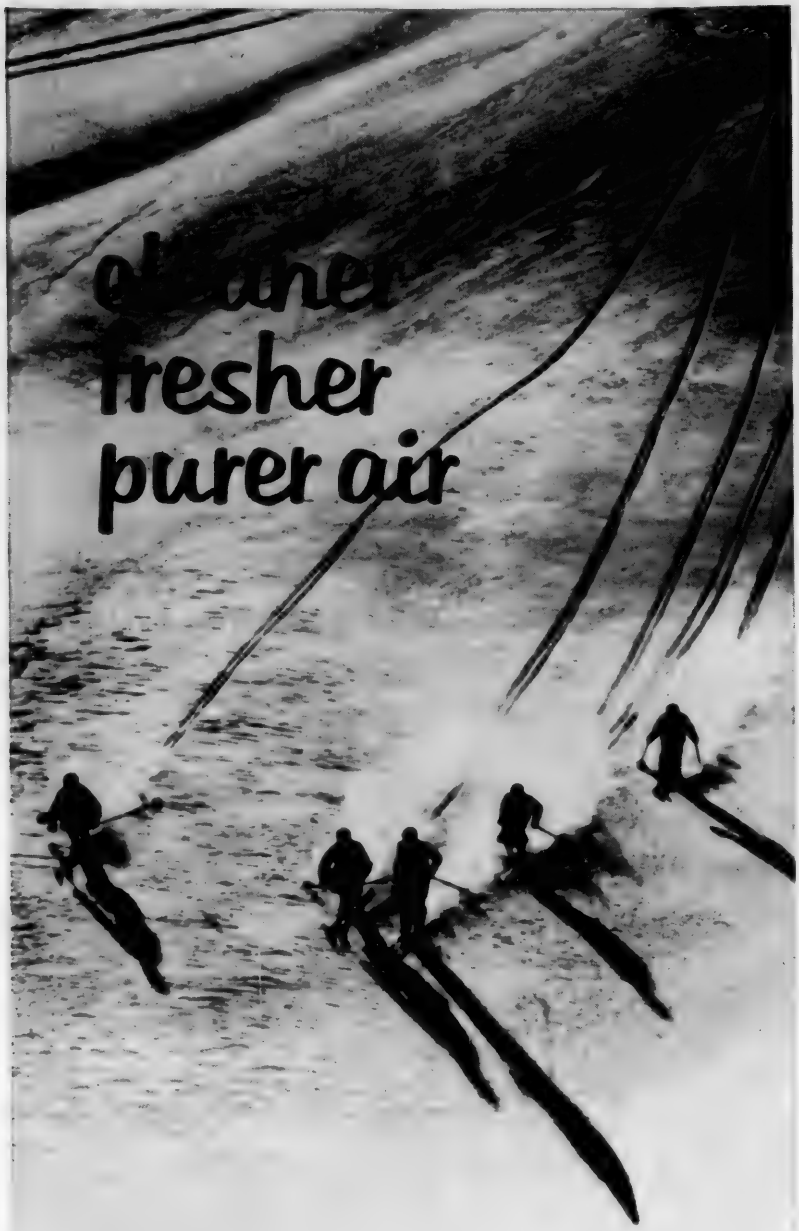
Bridgeport came up with the answer—Admiralty tubes. Since the switch, over 1,000 Typhoon heat pumps have gone into service without one instance of tube failure due to corrosion in sizes varying up to 1,000,000 BTU's.

Here again is an example of how *standard* Bridgeport alloys overcame *special* fabricating and corrosion problems. It's also an example of why it pays to take advantage of Bridgeport's outstanding metals know-how. Call in the Man from Bridgeport, today. There's a Sales Office near you. Or write to Dept. 6201.

BRIDGEPORT BRASS COMPANY

Bridgeport 2, Connecticut • Sales Offices in Principal Cities

Specialists in Metals from **A***luminum to* **Z***irconium*



Air dust-free as wind-scoured mountain slopes! Dust-magnet filters are electrostatic, trapping particles small as 1/10th of a micron. Permanent, non-clogging . . . when dirt-laden simply rinse clean and replace in unit. Available for furnaces and air conditioners. As you live and breathe . . . install Dust-magnets!

DUST-magnet FILTERS

a product of Stoddard Industries

1545 KINGSBURY STREET • CHICAGO 22

NEW CATALOGS

(Continued from page 138)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

EVAPORATIVE ROOF COOLING — Evaporative roof cooling with spray nozzles manufactured by Spraying Systems Co., Bellwood, Ill., is covered in Bulletin 81 published by that company. Engineering information is provided, including operating data and installation dimensions. Automatic control accessories are listed.

Circle **Item 84** on Inquiry Card

FINNED HEAT EXCHANGERS — A new brochure, No. 5003, describing the advantages of Inner-Fin coils in solving space and weight problems in adapting cooling equipment to the confined systems of electronic equipment, missiles and aircraft, is offered by Dunham-Bush, Inc., West Hartford, Conn.

Circle **Item 85** on Inquiry Card

FORGED STEEL UNIONS—An 8-page catalog, U-2-58, covering the company's complete line of W-S forged steel unions is available from Forge and Fittings Div., H. K. Porter Co., Inc., Roselle, N. J. It provides detailed specification data on all types, sizes, materials, and pressure ratings. Complete line is illustrated.

Circle **Item 86** on Inquiry Card

RIGHT ANGLE GEARMOTORS — The Louis Allis Co., Milwaukee, Wis., has published a 4-page bulletin, No. 3050, on its line of right angle gearmotors. Bulletin offers engineering information on gear motor ratings of ⅓ to 30 hp, single reduction, with output speeds of 23 to 280 rpm.

Circle **Item 87** on Inquiry Card

PRESSURE, VACUUM GAGES—A 32-page catalog, No. 525D, on dial indicating and recording pressure and vacuum gages is available from Weksler Instrument Corp., Freeport, N. Y. Catalog describes gages in 3, 3½, 4, 6, and 8½-inch dial sizes in ranges from 10 inches of water to 10,000 psi.

Circle **Item 88** on Inquiry Card

PACKAGED WATER CHILLERS—Model HE packaged water chillers, in sizes from 20 through 60 tons, are described in Catalog No. 535, published by Acme Industries, Inc., Jackson, Mich. The 8-page catalog includes complete description, performance data, specifications, and dimensions.

Circle **Item 89** on Inquiry Card

(Continued on page 142)

SAFE and SECURE

Ric-wiL Underground Piping Systems are safe and secure from tornadoes and hurricanes . . . virtually unaffected by surface weather conditions. In recent years, changing weather patterns have brought severe storms to areas in the United States that had never before experienced them. Ric-wiL Underground Systems remained unharmed . . . and in an emergency situation, immediate heat can be an important factor in restoring operations as quickly as possible.

Ric-wiL Systems have been proven by installations totaling more than 8,000,000 lineal feet. They are completely prefabricated and shipped to the job sight ready for installation. Production time and delivery can be definitely predetermined.

Write, wire or phone for information on the many types of Ric-wiL Systems available.

Send for new revised catalog.

Quality Piping Systems . . .
. . . of Exceptionally High Thermal Efficiency

SINCE 1910

RIC-WIL INCORPORATED — PREFABRICATED INSULATED PIPING SYSTEMS

BARBERTON, OHIO

IN CANADA: THE RIC-WIL COMPANY OF CANADA LIMITED

See our catalog in Sweets

for FUME

CONTROL

install

FLEXAUST®

HOSE

Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
For *all* kinds of fume and dust control, and ventilation uses.
Extremely flexible, durable, and lightweight.
Exceptionally easy to cut, install, connect, reuse, and relocate.
Sizes 1¼" thru 36" i.d.

Write for details today
Distributors
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THE FLEXAUST COMPANY
Dept. HV-4
PARK AVE. NEW YORK 17, N.Y.

NEW CATALOGS

(Continued from page 140)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

HEAVY-DUTY SPACE HEATERS — A single-page bulletin, EN-5900, containing typical specifications for heavy-duty, direct-fired forced air heaters is issued by Reznor Manufacturing Co., Mercer, Pa. On the reverse side of the bulletin are a cut-away drawing, description, and engineering data for the company's Series "S" heavy-duty space heaters.

Circle **Item 90** on Inquiry Card

V-BELT DRIVES — A 44-page engineering bulletin (A-695), from Dodge Manufacturing Corp., Mishawaka, Ind., describes a new line of V-belt drives that are smaller, cost less, weigh less, and require less space than conventional V-belt drives. Tables of pre-engineered drives make this an easy-to-use manual. Other tables give horsepower capacities, belt speeds, center distances, and sheave diameters.

Circle **Item 91** on Inquiry Card

SHEET METAL MACHINERY — A 24-page catalog from The Lockformer Co., Chicago, Ill., describes the company's line of sheet metal machinery. Equipment includes a variety of models of lock-forming machines, power flangers, flanger attachments, and special machines to produce practically any sheet metal shape desired.

Circle **Item 92** on Inquiry Card

INDUCED DRAFT FANS — Exclusive features and capabilities of a new induced draft fan, which reduces stack maintenance costs while improving combustion in either hand-fired or mechanically-fired boilers, are discussed in Bulletin L-1A, offered by Lehigh Fan & Blower Div., Fuller Co., Catasauqua, Pa.

Circle **Item 93** on Inquiry Card

ALUMINUM MILL PRODUCTS — An aluminum mill products brochure gives complete specifications for the hundreds of alloys and forms of aluminum available from Reynolds Metals Co., Richmond, Va. Starting with a description of the light metal's advantages, the 18 pages include alloy and temper designations, fatigue and shearing strengths, and various alloys available in foil, sheet and plate, wire, rod and bar, tubing and pipe, and extruded and structural shapes. Fabricating and finishing techniques are summarized.

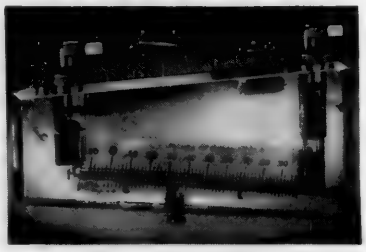
Circle **Item 94** on Inquiry Card

(Continued on page 144)

FILTER EFFICIENCY

at a glance...

ANYTIME!



Dwyer

AIR FILTER GAGE

With the Dwyer Air Filter Gage you can be sure of maximum filter efficiency because you know the *exact* time to replace filters, *every time*. Gives a continuous, accurate check that spots inefficient filters, yet prevents waste through premature replacement.

The Dwyer measures filter efficiency the only practical and economical way—via pressure drop. Quickly pays for itself through savings in replacement and service time and greater operating efficiency.

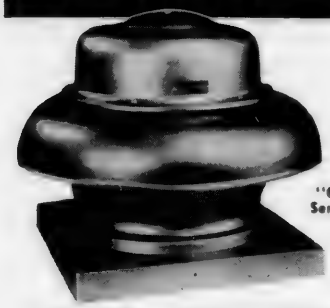
Break-proof plastic construction, lifelong accuracy, simple installation, no moving parts to ever wear out or get out of adjustment. Ranges 0-½", 0-1", 0-2" and 0-3" water. A complete unit with all necessary tubing, fittings, etc.

Write for Bulletin C10

F. W. DWYER MFG. CO.

P. O. Box 373-N • MICHIGAN CITY, IND.

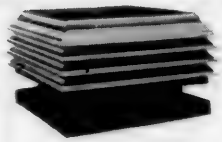
GREENHECK *Air Movement Devices*



"C" Series

1959 "COLUMBUS" CENTRIFUGAL POWER ROOF EXHAUSTER

The clean solid lines of the new COLUMBUS direct drive (range from 75 to 22,000 CFM) centrifugal power roof exhausters are the first indications of the top quality materials and careful workmanship that make up each GREENHECK power ventilator. Non-overloading wheels, rubber vibration mountings, rugged ball bearing motors isolated from the exhausted air stream, and spun aluminum housings for lasting beauty provide top value. The companion BOSTON series belt drive units feature identical housings with an extended range (from 500 CFM to 4300 CFM). Write today for catalog 6-7 which gives complete engineering information.



WAUSAU
Air Mover Belt drive centrifugal power roof exhauster. 300 CFM to 27,000 CFM range.

DALLAS
Air Mover Belt drive centrifugal power roof exhauster.

TUCSON ROOF EXHAUSTER
Air mover provides low silhouette centrifugal roof exhauster — capacity 200 to 20,000 CFM.

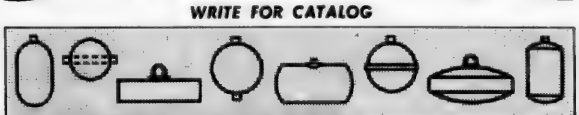
GREENHECK
FAN & VENTILATOR CORP.
SCHOFIELD • WISCONSIN

HARRIS INDUSTRIAL FLOATS

COPPER
STAINLESS STEEL
MONEL
STEEL
BRASS
ALUMINUM

Built for open or closed tank operation at low or high pressures and temperatures.

WRITE FOR CATALOG



ARTHUR HARRIS & CO.
Established 1874
206 N. Aberdeen St.
Chicago, Ill.

ACCEPTED *Allen* ROOF VENTILATION

Whatever your ventilating needs, be sure to see how Allen equipment can meet your requirements efficiently and economically.

NEW "I-LINE" for EYE APPEAL

The new "I-Line" provides an attractive low contour, assuring maximum capacity or efficiency with the minimum over-all height.

POWERFUL "VD" for HIGH VELOCITY

By moving a large volume of air at high velocity, this Vertical Discharge fan keeps fumes from sifting back into building.

Allen

. . . is prepared to investigate ventilating problems and plan systems for the efficient removal of heat, fumes, vapor or dust.

WIND-DRIVEN TURBINES

Three types of Allen turbines take full advantage of the economy of natural air movement.

EXHAUST FANS

Remote drive Staxauster is designed to handle corrosive fumes, and/or high temperature air.

THE ALLEN LINE

Write today for catalog that gives specifications and performance data on these and other units in the Allen ventilator line.

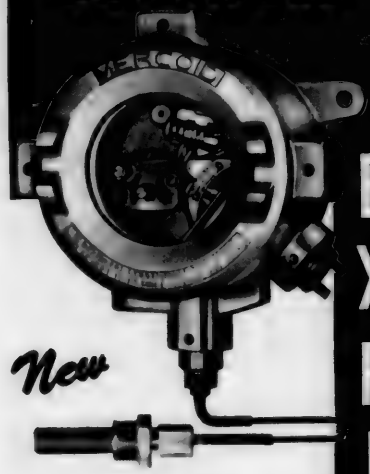
ALLEN

ALLEN COOLER & VENTILATOR, INC.
ROCHESTER, MICH.

Roof Ventilators for Every Commercial and Industrial Need
REPRESENTATIVES IN PRINCIPAL CITIES

MERCOID TEMPERATURE CONTROLS

EXPLOSION-PROOF



SERIES DAH-35
REMOTE STEM
TEMPERATURE CONTROLS

APPROX. WEIGHT 9¼ LBS.

OUTSIDE ADJUSTMENTS

VISIBLE CALIBRATED DIAL

VISIBLE OPERATION
You can tell at a glance whether switch circuit is on or off

SEALED MERCURY CONTACT

UL APPROVED*

SURFACE OR PANEL MOUNTING

OPERATING RANGES
13 operating ranges from -60+30°F. to 370-530°F.

Available with Breather or Drain

WRITE FOR BULLETIN DAH

THE MERCOID CORPORATION
4205 Belmont Avenue,
Chicago 41, Illinois.

*LISTED BY

Series DAH-35
Class 1, Group C & D;
Class 2, Group E, F, G;
NEMA 7CD, 9EFG

NEW CATALOGS

(Continued from page 142)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

PLASTIC SEWER AND DRAIN PIPE—A 12-page manual giving complete specifications and test data on Carlon "D" plastic sewer and drain pipe is published by Carlon Products Corp., Aurora, Ohio. Booklet details the recently-established industry specifications for plastic drain pipe, and additional data resulting from three years of tests with Carlon "D". Comparison charts with bituminized fiber pipe are included, as are specifications for molded fittings.

Circle **Item 95** on Inquiry Card

SPIRAL-WOUND METAL GASKETS — A new bulletin, published by The Garlock Packing Co., Palmyra, N. Y., describes the design, construction and utility of the firm's Guardian spiral-wound metal gaskets. Bulletin AD-104 lists the various types available for special applications. In addition, it lists compressibility and resistance features of the metal gaskets, and contains a section on the relationship of the flange face finish to the gasket efficiency.

Circle **Item 96** on Inquiry Card

VIBRATION CONTROL—A 6-page engineering data folder, providing information on simplified machine installation and vibration control, is available from Unisorb Div., The Felters Co., Boston, Mass. It provides a basic description of Unisorb and its advantages, and includes a special presentation of vibration transmissability as opposed to the driving frequency of machine tools.

Circle **Item 97** on Inquiry Card

DIFFERENTIAL PRESSURE TRANSMITTER—Bulletin WG-1824, Supplement A, published by Yarnall-Waring Co., Philadelphia, Pa., describes the company's differential pressure transmitter. Bulletin gives applications, operation, construction details, advantages, and operating specifications.

Circle **Item 98** on Inquiry Card

SAFETY-TYPE PRESSURE GAGE — Kunkle Valve Co., Fort Wayne, Ind., includes in its catalog of pressure gages a new safety gage case for all pressure applications. This supplements the broad range of types, sizes, capacities and materials listed in the 48-page gage catalog which is available from the company.

Circle **Item 99** on Inquiry Card

(Continued on page 146)

WHY THERE'S NO "OR EQUAL" WHEN YOU SPECIFY WIREMOLD AIR DUCT

Unlike any other flexible air duct, Wiremold Air Duct is made with a *flat* metal spiral that *mechanically locks* to the fabric component. Here's what this construction means to you:

- With Wiremold you get a *mechanically locked* seam the same as you insist upon with sheet metal duct. There are no glues or adhesives that may dry out and fail with age.
- Wiremold's exclusive *flat* metal spiral assures accurate size — and snug connections.
- Cuffed ends (and cuffing equipment) are never needed.
- Unlike ducts with cuffed ends, Wiremold's fabric and metal are *both* secured to end fittings, making stronger connections.
- Two lengths of Wiremold can be joined simply by screwing them together. No collars or clamps are needed.

FOR AIR CONDITIONING • EXHAUSTING
MATERIALS HANDLING • MANY OTHER USES

WIREMOLD® AIR DUCT

ask your distributor, or write
THE WIREMOLD COMPANY • HARTFORD 10, CONN.

Pittsburgh Superfine is quickly cut to correct size with a knife. Cut sections are then bonded to duct with adhesive. Extra adhesive is applied to edges of insulation to adhere them to edges of metal.

"We used one-inch, 1½-lb. density Pittsburgh Superfine Fiber Glass Insulation with a Neoprene coating to line all ducts," says Mr. George P. Fenton. "Superfine is flexible, adaptable and easy to handle."

At Greater Pittsburgh Airport's New Extension— Pittsburgh Superfine Insulates Air Conditioning Duct Work

"When our company installed the sheet metal ducts for the two air conditioning systems at Greater Pittsburgh Airport's new East Dock, we used over 7,000 sq. ft. of Pittsburgh Superfine Fiber Glass Insulation as the acoustical and thermal lining for the ducts," reports Mr. George P. Fenton, General Manager, McIlroy Sheet Metal Engineers and Fabricators, Pittsburgh, Pennsylvania.

Why Pittsburgh Superfine was specified

"This job called for an insulation that could withstand air velocities, would have proven erosion resistance, would provide good acoustical properties at minimum cost, and would insure resistance against temperature differential. Pittsburgh Superfine met all these requirements easily."

Easy to work with on the job

"We've used Pittsburgh Superfine often, and know from experience that it's flexible, adaptable, easy to handle and easy to cut. It's especially adaptable for use in irregularly curved ducts. There was not a single installation problem on the airport job that we could not handle with Superfine," concluded Mr. Fenton.

Pittsburgh Superfine Fiber Glass can help you, too!

It's rot proof, fire-resistant . . . and it's the finest insulation against heat, cold or noise you can get! Available in a variety of facings to meet your needs. For complete information, write to *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pa.*

PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh and St. Louis

FIBER PG GLASS PITTSBURGH PLATE GLASS COMPANY

GET TROUBLE-FREE CONDENSING AND GREAT POWER AND LABOR SAVINGS

NIAGARA AEROPASS CONDENSERS give you trouble-free, automatic refrigeration at the least spread between head-pressure and suction pressure. You gain a great power saving. You also get removal of superheat before condensing, condensing at subcooled temperature and a refrigerant fully purged of oil. Out-door air takes up heat of condensation through evaporation of the least amount of water; low temperature condensing means freedom from scaling and loss of capacity. Niagara sectional design offers you lower costs for more compact equipment, easier to keep up. You get always full capacity, "new plant" efficiency and continuous savings such as 95% of condensing water cost that add to your profit. Managers who know their costs buy Niagara Aeropass Condensers.

Write for Bulletin 131

NIAGARA BLOWER COMPANY

Dept. HV-4, 405 Lexington Ave., New York 17, N.Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

1. **LOW FIRST COST**—Here is the first forced draft WATER TUBE package boiler whose cost is comparable to most fire tube units—yet offers so much more efficiency and economy.

2. **LOWER OPERATING COST** — Guaranteed 81% efficiency means greater fuel economy—and water tube design assures the fastest generation of steam or hot water.

3. **LOWER MAINTENANCE COST**—Water cooled tube ends plus full access to both the fireside and waterside of all tubes reduces maintenance time and cost to an absolute minimum.

IBW BOILER BUILDERS SINCE 1886

Get full details from your INTERNATIONAL DISTRICT REPRESENTATIVE or write for Bulletin 1400 today.

THE INTERNATIONAL BOILER WORKS CO.

Steel Firebox Heating & Power Boilers Low & High Pressure Water Tube Package Boilers • International-LaMont Forced Recirculation Generators • ASME Code Pressure Vessels & Welded Products.

890 Spruce St. East Stroudsburg, Pa.

NEW CATALOGS

(Continued from page 144)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

AIR HANDLING UNIT—Model AC central station type air handling unit, in capacities from 665 to 19,200 cfm, is described, including performance data, specifications and dimensions, in a 12 page catalog released by Acme Industries, Inc., Jackson, Mich. Catalog No. 382A also covers accessories such as mixing boxes, face and bypass dampers, coils and other related items.

Circle **Item 100** on Inquiry Card

TEMPERATURE CONTROLS—An 8-page booklet, MC-177, is published by Fenwal Inc., Ashland, Mass., to describe its Thermoswitch controls and mounting wells. Included are a description of how Thermoswitch units operate on the differential expansion of metals, complete operating specifications and dimensions, and available modifications and special features.

Circle **Item 101** on Inquiry Card

ORSAT GAS ANALYZERS—A 12-page illustrated brochure describing the company's Orsat gas analyzers is available from The Hays Corporation, Michigan City, Ind. The Orsat method of measuring gases has been accepted as the standard of accuracy in industrial and scientific work since 1874. Complete information and specifications for over 85 different models are contained in Publication 55-668-27.

Circle **Item 102** on Inquiry Card

TEMPERATURE-MILLIVOLT TABLES—A new, compact chart of temperature-millivolt conversion tables for thermocouples is available from Thermo Electric Co., Inc., Saddle Brook, N. J. This chart makes it possible to quickly convert either Fahrenheit or Centigrade temperatures, in 5-degree increments, to millivolt values for eight different thermocouple calibrations.

Circle **Item 103** on Inquiry Card

A-C MOTOR SELECTIONS — An a-c motor selector booklet, Bulletin B-2103-4, gives concise selection data to users of a-c motors in sizes from one through 200 hp. Included in the 12-page booklet, from Reliance Electric and Engineering Co., Cleveland, Ohio, are brief explanations of NEMA design classes, speed-frequency relationship, current and torque values, frame selection tables, and complete dimension information.

Circle **Item 104** on Inquiry Card

(Concluded on page 148)

"from Chicago"

More than 12,000 installations

FLUSH KLEEN® Sewage Pumps Service Dallas Statler Hotel

Jaros, Baum and Bolles, mechanical engineers • William B. Tabler, architect • Robert E. McKee, Inc., general contractor • J. S. Brown, and E. F. Olds, plumbing contractors

Duplex type F "FLUSH KLEEN" Sewage Pump

Chicago Type F "FLUSH KLEEN" Sewage Pumps were selected to provide uninterrupted service for the 15 million dollar, 18 story Dallas Statler . . . one of the largest hotels in the southwest, with 1,001 guest rooms, a ballroom equipped to accommodate over 3,000 persons and luxurious dining and social rooms. "FLUSH KLEEN" Sewage Pumps are standard equipment in fine buildings everywhere.

THEY ARE COMPLETELY CLOG-PROOF!

Only liquid is handled by the impeller. Solids and other coarse matter are retained in the strainer housing until cleanly flushed to the sewer.

Chicago "FLUSH KLEEN" Sewage Pumps are sold and serviced by competent Distributors located in most principal cities. See the one nearest you today or write direct for full details.

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION

Chicago Pump Company

622J DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

AirMpeler
LO-BOY
CENTRIFUGAL
ROOF EXHAUSTERS
Enhance The Beauty Of Building Skylines

Pats. Pend.

Lowest Silhouette Design

FORWARD OR BACKWARD CURVE WHEEL WITHIN . . . . OR OUT OF SCROLL HOUSING

Motor mounting on side of structure support . . . out of line of air stream reduces height of Lo-Boy models nearly 50% of older designs.

LOW WIND RESISTANCE
SIZES 10"-72" 600-47,000
CERTIFIED C.F.M. RATINGS

- **QUALITY**
- **BEAUTY**
- **PROVEN PERFORMANCE**

See Sweet's File 20c/Amm or Write for bulletin AC-100-59

AMMERMAN CO., INC.
P. O. Box 182 Stillwater, Minnesota
MEMBER OF THE AIR MOVING & CONDITIONING ASSN.

NEW CATALOGS

(Concluded from page 146)

DISSOLVED OXYGEN METER — A complete description and details of operation of the Hays dissolved oxygen meter, together with description of the three basic units which make up the new meter, are contained in three product specification sheets offered by The Hays Corporation, Michigan City, Ind. The meter automatically and continuously records dissolved oxygen in surface waters. Illustrations include schematic diagram.

Circle **Item 105** on Inquiry Card

FLEXIBLE RUBBER PIPE—Bulletin 7152, available from Manhattan Rubber Div., Raybestos - Manhattan, Inc., Passaic, N. J., describes Condor flexible rubber pipe, for use wherever corrosion, abrasion, vibration or thermal expansion would necessitate excessive replacement of conventional pipe. The lightweight rubber pipe is easy to install, eliminating fabricated bends, leaky joints, and costly rearrangement of existing facilities.

Circle **Item 106** on Inquiry Card

FELT FILTRATION — Technical Data Sheet No. 15, covering performance characteristics and selection of proper felts for mechanical filtration of air, gases and liquids, is available from American Felt Co., Glenville, Conn. According to the bulletin, felt filters serve as an efficient, economical medium for mechanical filtration where maximum retention efficiency, high permeability, low plugging rate, and long life are primary design requirements.

Circle **Item 107** on Inquiry Card

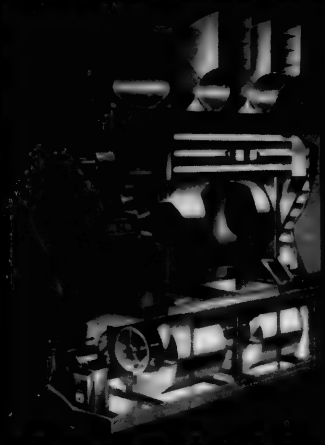
HIGH-VELOCITY AIR VALVE—A 2-page bulletin from Connor Engineering Corp., Danbury, Conn., describes and illustrates Pneumafoil, a high-velocity air valve which operates without motors or linkage mechanism of any kind. Bulletin contains dimensional data and air capacities for sixteen basic sizes. Also included is information on Manufoil, a valve which has air flow characteristics identical to Pneumafoil's, but which is designed to enable manual setting.

Circle **Item 108** on Inquiry Card

INDUSTRIAL TRUCKS — Automatic Transportation Co., Chicago, Ill., has published Industrial Trucks Selector Guide which will be of assistance to material handling men in setting up new systems or revising present systems in relation to specific plant problems. Over 150 models to fit all requirements are illustrated in this 20-page booklet. Selection factors, such as capacity, frequency of use, power source, and use of semi-standard or special trucks, are included.

Circle **Item 109** on Inquiry Card

LENNOX
"OG" SERIES
INDUSTRIAL HEATER

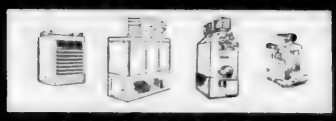


Remarkable Adaptability

Efficient heat transfer design results in reduced physical size of this heater . . . allowing it to take up a minimum of space. If floor space is at a premium, the "OG" can be suspended horizontally or inverted. Removable nozzles permit free standing or ducted installations.

DUAL FUEL
Power Burners
Burner operates equally well with either gas or oil. Changeover is instant and automatic.

LENNOX "Task-Matched" Equipment to control and condition air for industry



64,000 to 2,000,000 Btuh

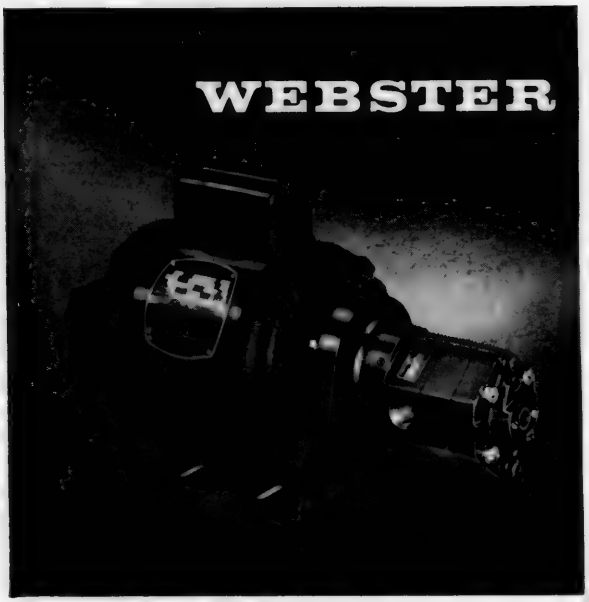
CLIP AND MAIL FOR FREE SPEC SHEETS

LENNOX Industries Inc.
INDUSTRIAL DIVISION
P.O. Box 1294, Dept. AC-4
Des Moines 5, Ia.

Please send me—without obligation—complete specifications and engineering data on Lennox "OG" Series Industrial Heaters

Name.....
Company.....
Address.....City.....
Title.....

WEBSTER SUPPLY PUMPS



Capacities to 575 GPH

This is the way to handle all furnace oils, especially heavy no. 5 and 6 grades — with an extra measure of dependability required for commercial and industrial applications. Webster supply pumps are motor equipped, provide a range of capacities from 15 GPH to 575 GPH. Heavy oil models have extra large ports to transfer initially cold, heavy oils without restriction.

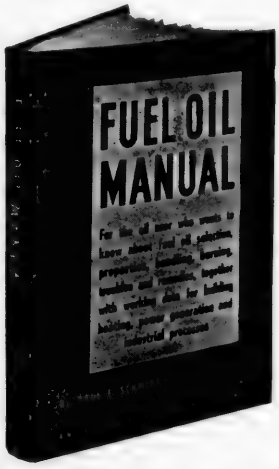
Webster pumps are compact, easy to install. Require less plumbing. Engineering bulletins give complete specifications and mounting dimensions.

call the man from Webster

MODEL 2311B fills the need for a lightweight, portable pump and motor combination. Transfers fuel oil, kerosene or other lubricating liquids. Mounted on wood base, with carrying handle and 25-foot cord.

HEATING DIVISION
WEBSTER ELECTRIC
RACINE · WIS
our 50th year

Franklin adv. A-132



Here is a book that will give you a comprehensive picture of the characteristics and uses of every type and grade of fuel oil. The author explains the meaning of each oily property, and shows how this information is applied to the selection, handling and burning of fuel oil. Impurities and how they effect combustion are described fully, and a special chapter describes fuel oil additives and how they are used. Another chapter lists troubles which may be encountered in using fuel oils, and shows the correct remedy to apply in each case. Technical language is avoided wherever possible and all terms are fully explained.

160 Pages **$4.50** 34 Tables

By mail order, Canada or overseas, $5.50

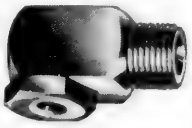
THE INDUSTRIAL PRESS
93 Worth Street **New York 13, N. Y.**

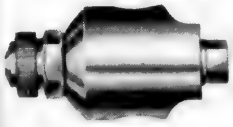
Design... Capacity
SPRAY NOZZLES

TO LOWER THE COST OF CONDITIONING AIR

• With spray nozzles from Spraying Systems you gain the advantages of DESIGN for *exact* control of spray characteristics . . . and complete range of sizes for selecting the *exact* CAPACITY needed.

FOR WASHING—wide angle Whirljet spray nozzles. Large orifice, non-clogging with tapered inlet, no internal vanes.

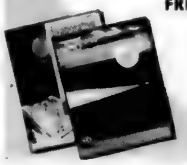




FOR HUMIDIFYING—precision made Pneumatic Atomizing nozzles. Highly atomized spray vaporizes instantly and completely.

FOR COOLING—complete choice of nozzles for spray ponds, cooling towers and roof cooling. Proper distribution and atomization for efficient cooling and minimum driftage.

FREE INFORMATION—*just write for Bulletins 81 and 82.*



SPRAYING SYSTEMS CO.
3261 Randolph Street
Bellwood, Illinois

MEASURE

ACTUAL AIR DELIVERY

with Alnor® VELOMETER

A simple, direct reading on the Alnor Velometer gives you instant measurement of actual air delivery in any distribution system. This fast, precise method eliminates the time and money wasted in trial-and-error balancing...the profit-eating call-backs so often necessary with other less precise measurements.

The Velometer is the only instantaneous, direct reading air velocity meter—accurate in all ranges, from high to low... compact, portable, easy to understand and use. Wide assortment of jets and fittings makes this precision instrument ideally suited for all air velocity measurement.

First Choice of Industry

Take the recommendation of every major manufacturer of air diffusers and leading contractors—get an Alnor Velometer. You'll save time and money on the next installation you balance.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Illinois Testing Laboratories, Inc.
Room 514, 420 N. LaSalle St.
Chicago 10, Ill.

Please send Velometer Bulletin 2448-G.

Name.....

Company.....

Address.....

City.....Zone.....State.....

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

OHI CONVENTION—37th annual convention of the Oil Heat Institute of America, Inc., at the Olympic Hotel, Seattle, Wash. Secretary, OHI, 500 Fifth Ave., New York 36, N. Y. ..... **APRIL 28-MAY 2, 1959.**

CONSULTING ENGINEERS COUNCIL—Third annual general meeting of the U. S. Consulting Engineers Council, Biltmore Hotel, New York, N. Y. Executive secretary, Larry N. Spiller, 326 Reisch Building, Springfield, Ill. ..... **APRIL 28-MAY 3, 1959.**

LPGA TRADE SHOW—5-Star Trade Show and convention of the Liquefied Petroleum Gas Association, at the Conrad Hilton Hotel, Chicago, Ill. Secretary of the Association, 11 S. LaSalle St., Chicago 3, Ill. ..... **MAY 3-6, 1959.**

NDHA CONVENTION—50th annual meeting of the National District Heating Association, Skytop Lodge, Skytop, Pa. Secretary-Treasurer, John F. Collins, Jr., 827 N. Euclid Ave., Pittsburgh 6, Pa. ..... **JUNE 1-4, 1959.**

ASTM MEETING—Annual meeting of the American Society for Testing Materials, at Chalfonte-Haddon Hall, Atlantic City, N. J. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. ..... **JUNE 21-26, 1959.**

ASHRAE MEETING—Annual meeting of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, at the Lake Placid Club, Lake Placid, N. Y. Secretary of the Society, 62 Worth St., New York 17, N. Y. ..... **JUNE 22-24, 1959.**

AIR POLLUTION CONTROL MEETING—Annual meeting of the Air Pollution Control Association, at the Hotel Statler, Los Angeles, Calif. H. M. Pier, executive secretary of the Association, 440 Fifth Ave., Pittsburgh 13, Pa. ..... **JUNE 22-26, 1959.**

ASSE MEETING—Annual meeting of The American Society of Sanitary Engineering, at the Mayflower Hotel, Washington, D. C. M. Mercury, treasurer-secretary of the Society, 4328 South Western Ave., Chicago 9, Ill. ..... **JULY 19-24, 1959.**

ISA INSTRUMENT-AUTOMATION EXHIBIT—14th annual Instrument-Automation Conference and Exhibit of the Instrument Society of America, at the International Amphitheatre, Chicago, Ill. H. S. Kindler, ISA, 313 Sixth Ave., Pittsburgh 22, Pa. ..... **SEPTEMBER 21-25, 1959.**

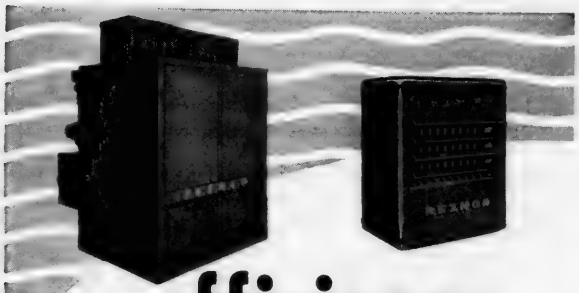
AGA CONVENTION—Annual convention of the American Gas Association, at the Conrad-Hilton Hotel, Chicago, Ill. C. S. Stackpole, managing director of the Association, 420 Lexington Ave., New York 17, N. Y. ..... **OCTOBER 5-7, 1959.**

ARI EXPOSITION—11th Exposition of the Air-Conditioning and Refrigeration Industry at Convention Hall, Atlantic City, N. J. Geo. S. Jones, Jr., managing director of Air-Conditioning and Refrigeration Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. ..... **NOVEMBER 2-5, 1959.**

WARM AIR HEATING CONVENTION—Annual convention of the National Warm Air Heating and Air Conditioning Association, at the Chase Hotel, St. Louis, Mo. G. Boeddener, managing director of the Association, 640 Engineers Bldg., Cleveland 14, Ohio. ..... **DECEMBER 1-4, 1959.**

ASHRAE MEETING—Semi-annual meeting of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, and the 2nd Southwest Heating and Air-Conditioning Exposition, sponsored by ASHRAE, in Dallas, Tex. The meeting will be at the Baker and Adolphus Hotels, and the Exposition in the Memorial Auditorium. Secretary of the Society, 62 Worth St., New York 13, N. Y. ..... **FEBRUARY 1-4, 1960.**

CONGRESS ON OCCUPATIONAL HEALTH—13th International Congress on Occupational Health, first to be held in the Western Hemisphere, at the Waldorf Astoria Hotel, New York City. Dr. Leo Wade, organizing committee, 15 W. 51st St., New York 19, N. Y. ..... **JULY 25-29, 1960.**



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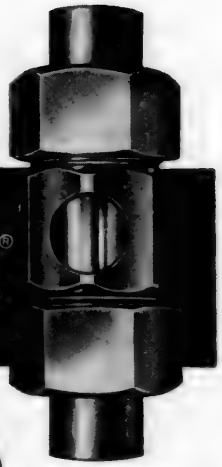

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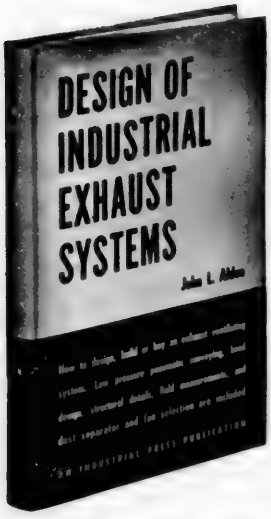

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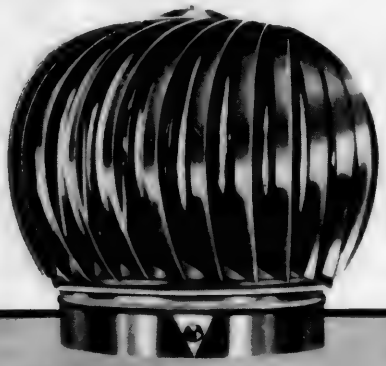

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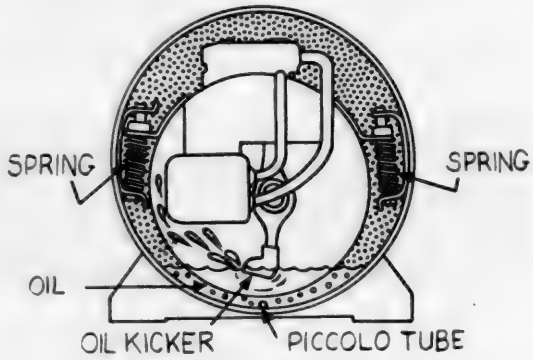
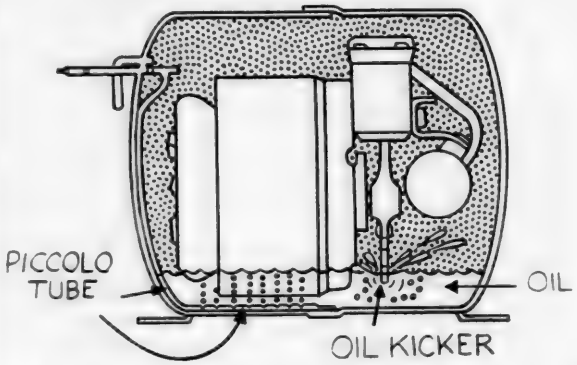
NEW WAY FOUND

to muffle noise of refrigeration compressor. System bubbles evaporator gas through oil to create foam.

A new method of reducing and controlling the noise level of refrigerator compressors has been developed by Westinghouse Electric Corp., Pittsburgh, Pa. The method is based on the sound absorption principle that transmission and reflection of sound waves in a substance is related to the density: the less dense the substance the greater the absorption of sound wave energy. Therefore, by making the oil foam in the new Westinghouse internally spring-mounted compressors, engineers have appreciably reduced the unwanted noise that results from the compressor operation, the company states.

The new compressors are being used on the 1959 line of Westinghouse refrigerators. A patent is pending.





To refrigerate, Freon 12 is compressed into a cold liquid and when the cold has been removed, it expands into a gas and returns to the compressor in a gaseous state, it was explained. Instead of returning the gas directly to the chamber adjacent to the compressor, some of it is passed through the oil surrounding the compressor to create sound-deadening foam.

This aerating is augmented with another device. An agitator is attached to the drive shaft of the compressor piston. When the compressor is operating, the agitator flails the oil and creates additional bubbles.

Internally spring-mounted compressors have had growing acceptance in the refrigerator and air conditioning industry in recent years. However, noise has continued to be a problem. This new sound-deadening feature is a major step toward the solution of the noise problem.

BID SEPARATION

favored by 71% of Chicago architects polled by Mechanical Specialty Contractors Associations.

A recent survey of architectural offices in the Chicago area has shown that 71% are in favor of separate bids on plumbing, heating, ventilating and electrical contracts, according to Henry J. Couch, secretary of the Coordinating Committee, Mechanical Specialty Contractors Association of Chicago.

This information was obtained from a questionnaire sent out by the Coordinating Committee, which is composed of representatives of the Electrical Contractors Association of the City of Chicago, Mechanical Contractors Chicago Association, Plumbing Contractors Association of Chicago, and Ventilating & Air Conditioning Contractors Association of Chicago. These four associations represent a total of 413 individual contracting firms.

A total of 133 replies to the questionnaire were received, including all of the major architectural offices in the area. The importance of the subject, not only to contractors but also to architects, is evidenced by the fact that 42% added significant comments in their replies, the majority of which were strongly favorable toward separation of all mechanical work from the general contract.

In addition to stating preferences, each architect was asked to indicate the actual practice prevailing in his office. The results show that 36% of those polled take separate bids on all jobs, and another 40% take them on more than half of their jobs.

The Coordinating Committee is actively promoting the cause of separate bids, not only to eliminate "bid-shopping" and "bid-peddling" but also to establish a more direct line of contact between the architect and the mechanical contractor; to give the architect a greater voice in the selection of mechanical contractors and to reduce the over-all cost of building projects.

COMPETENT BOILER ATTENDANT

required in new California safety order applying to all fired vessels except domestic and vehicular.

California recently issued a safety order applying to boilers and fired pressure vessels, except those under Federal jurisdiction and those in household and vehicular use, reports Mutual Boiler and Machinery Insurance Company.

Boilers covered by Safety Order 781 must be under direct supervision of a responsible person, who must see to it that the boiler is operated by a competent attendant, and that the boiler and its connections are properly maintained. A competent attendant is one familiar with the particular boilers he attends, and who has received proper instruction in safe operation.

Among the rules for supervision of fired boilers operating at more than 15 psi are: an attendant should personally check the operation of the boiler, the necessary auxiliaries, and the water level in the boiler as often as necessary to insure safe operation—never leaving them unchecked for more than an hour.

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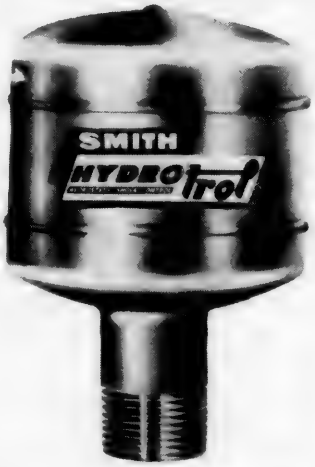

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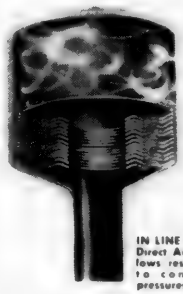

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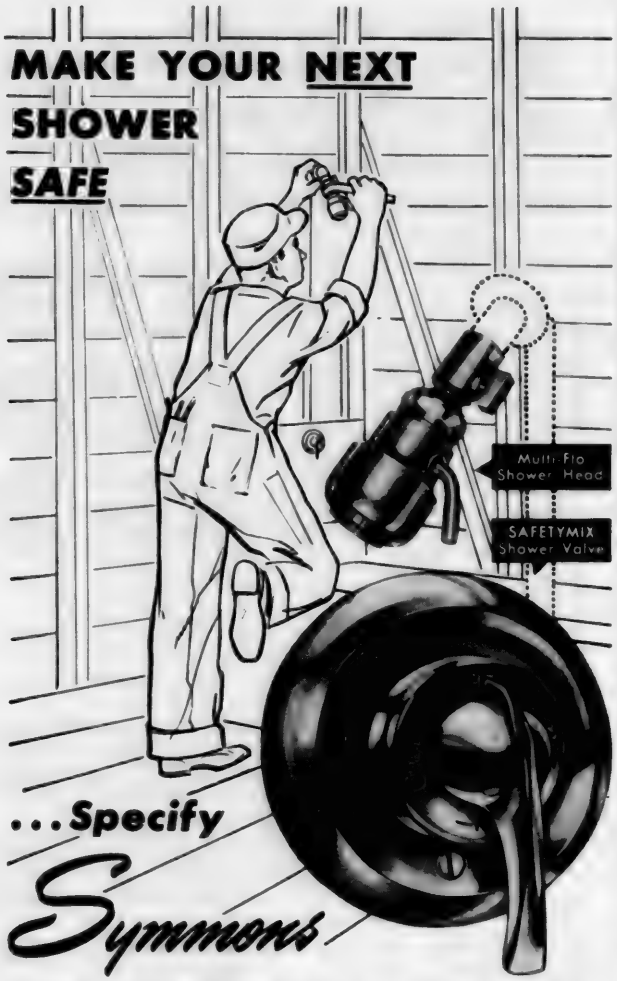

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GAS AIR CONDITIONING

Sales School to be held in Dallas, Tex., sponsored by the Industrial and Commercial Gas Section, AGA

Under the direction of the American Gas Association, the first Gas Air Conditioning Sales School will be held June 1 to 5 at the Baker Hotel, Dallas, Tex. Registration will be limited to 150 to provide more personalized treatment, and the registration fee is $50.

The course will cover the fundamentals of the various systems, cost analysis, commercial applications, marketing, sales and promotion activities.

For further details write Ralbern H. Murray, secretary, Industrial and Commercial Gas Section, American Gas Association, 420 Lexington Ave., New York 17, N. Y.

BRIEFLY STATED

(Continued from page 14)

by Dr. Walter H. Zinn. Dr. Zinn became a vice-president of Combustion. . . The name of American Metal Hose Div., The American Brass Co., is changed to ANACONDA METAL HOSE DIVISION.

WINNERS

Winners for the Wrought Iron Durability Contest sponsored by A. M. BYERS CO., Pittsburgh, Pa., at the 14th International Heating and Air Conditioning Exposition are: First prize, $100, to A. V. Petty, manager for Graves Refrigeration of Atlanta, Ga. His guess of 63 yr, 3 mo, 7 days came closest to the actual 63 yr, 4 mo, 23 days. Second prize of $25 went to Fred De Santi, commercial representative for Public Service E&G Co., Hackensack, N.J. The 1¼-inch pipe was removed from Stanford University. It had been in a condensate riser when the hall was built in 1891. . .

Employees of FRICK CO., Waynesboro, Pa., began a safety drive in February 15 of last year which carried them through a stretch of one million hours worked without a disabling injury through October 4, a new high in safety performance for the company. For this achievement, the plant has earned the "Million Hour Plaque" of the Pennsylvania Manufacturers Association Casualty Insurance Company.

WITH THE MANUFACTURERS

Carl A. Wagner is named to the position of director of marketing and advertising of CLEVELAND CONTROLS, INC., Cleveland, Ohio. He leaves G. M. Basford Co., advertising agency, after 21 years as account executive. . . G. V. "Pat" Paterson was elected to the office of vice-president by the Board of Directors of The Swartwout Co., also of Cleveland. He will continue as manager of the Ventilator Division.

Paul H. Schoepflin, Chairman of the Board, NIAGARA BLOWER CO., New York, N. Y., was recently elected

to the position of chairman and Chief Executive Officer, having served as its president since 1919. One of the founders of the company, Mr. Schoepflin is an honorary life member of the American Society of Heating and Air-Conditioning Engineers. . .

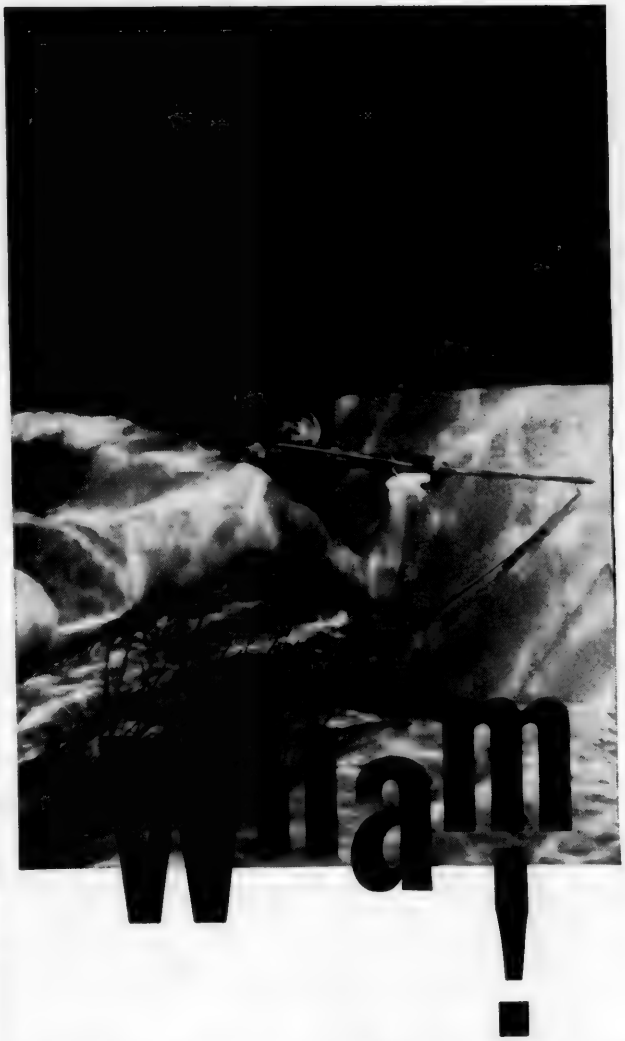
Several appointments in the sales organization of its Flexaust Division, manufacturers of coated fabric flexible hoses, have been announced by Callahan Mining Corp., New York, N. Y.: H. Stanley Johnson has been named general sales manager; T. G. May, in addition to being made eastern regional sales manager, has responsibility for advertising and sales promotion; R. P. Carrington has been appointed central regional sales manager and will have his headquarters in New York; S. J. Stanfield is named western regional sales manager and will establish offices in the Chicago area. . .

Appointment of R. H. Porterfield as manager, industrial sales, New York district, and of W. T. Farnsworth as manager of the Hartford (Conn.) district, is announced by ALLIS-CHALMERS INDUSTRIES GROUP, Milwaukee, Wis. Mr. Porterfield had been manager of the Hartford district since 1954. Mr. Farnsworth had been a sales representative in Allis-Chalmers Hartford district since 1953. Joseph Varacalli, formerly distributor supervisor for the Northeast Region, has been appointed supervisor of original equipment manufacture and distributor sales for the New York district. Mr. Varacalli has been asociated with the New York district since 1946. E. E. Strickland, formerly manager of industrial sales for the New York district, is appointed manager of general products division sales for the Group's Northeast Region. His headquarters will be in New York.

Canadian Degree-Days for February, 1959*

City	February		Cumulative	
	1958-59	Normal	1958-59	Normal
Calgary, Alta.	1432	1350	6681	6540
Charlottetown, P. E. I.	1431	1370	6172	5680
Crescent Valley, B. C.	1103	1080	5666	5660
Edmonton, Alta.	1472	1520	7455	7370
Fort William, Ont.	1662	1580	7690	7370
Grande Prairie, Alta.	1550	1600	8192	7720
Halifax, N. S.	1229	1180	5195	4955
London, Ont.	1241	1210	5520	5210
Medicine Hat, Alta.	1568	1380	6695	6380
Moncton, N. B.	1448	1380	6438	6000
Montreal, P. Q.	1465	1430	6284	6060
North Bay, Ont.	1572	1530	7051	6860
Ottawa, Ont.	1533	1450	6598	6300
Penticton, B. C.	1008	960	4787	4740
Prince George, B. C.	1391	1320	6798	6650
Quebec City, P. Q.	1609	1510	7107	6660
Regina, Sask.	1749	1680	8040	7770
St. John, N. B.	1380	1310	6230	5880
Saskatoon, Sask.	1749	1710	8188	7950
Timmins, Ont.	1754	1680	7951	7870
Toronto, Ont.	1196	1147	5123	4918
Vancouver, B. C.	732	740	3627	3750
Victoria, B. C.	684	660	3466	3430
Windsor, Ont.	1121	1100	5117	4760
Winnipeg, Man.	1810	1714	8133	7737

*These data are supplied through the courtesy of the Meteorological Division Air Service Branch, Department of Transport, Canada.



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WHAT READERS SAY

Chimney Sizing

EDITOR, AIR CONDITIONING, HEATING AND VENTILATING:

Please refer to the Data Sheet on pages 71 and 72 of your February, 1959, issue. It appears that the data shown on this sheet are recommended as being applicable to any boiler or furnace operating under conditions of barometric pressure, outside air temperature and stack temperature specified in the data.

Table 1 of the data sheet lists "Minimum Stack Dimensions," and the paragraph following that table states in effect that these values will be modified if the draft required for a particular fuel or grate is different from the IBR rate or if the coefficients for temperature, density, friction or barometric pressure are different. From this paragraph it appears the data sheet is intended to apply to all boilers and furnaces, unless one or more of these specified factors change.

However, the minimum dimensions listed in Table 1 are far from correct for all boilers and furnaces operating under the specified conditions. For example, the table states that chimney height cannot be as small as 31 feet for a firing rate of 60 lb per hour. We build and sell a boiler with a firing rate of 68 lb and recommend a stack height of 20 ft for that boiler. We know from laboratory tests and from field experience that our recommended chimneys are adequate. . . .

The chimney draft required for proper operation of a boiler or furnace depends on the required overfire draft *plus* the draft loss from the chimney to the fire box. The overfire draft required for a forced draft coal fired job may be relatively uniform for any given rate of fuel input, but the draft loss from the chimney to the firebox at a given firing rate depends on the design of the boiler or furnace and varies over a wide range among boilers having the same fuel burning rate. Therefore, it is impossible to determine a correct chimney size for a particular boiler or furnace without considering the draft loss through that specific boiler or furnace.

It would appear that the authors have developed a nomograph on the basis of some assumed arbitrary total draft requirements for each fuel burning rate, and have based their required draft on that arbitrary figure so that chimneys selected from the nomograph would develop the assumed required draft. Since the draft loss between the chimney and the firebox is a variable, this assumption is not valid. . . .

There appears to be an error in the third column heading of Table 1. I believe *D* should be the diameter of the stack, not the draft. It appears obvious that the tabulated figures could not be draft figures. . . .

J. W. Turner
Consulting Engineer
National-U. S. Radiator Corp.,
Johnstown, Pa.

There is no question that the author is essentially correct in the points he has raised. The data sheet is confusing in distinguishing between forced draft and natural draft and between available draft and required draft. Our correspondent is also correct in his assumption that Table 1 was in error in referring to draft rather than diameters.—*Editor*

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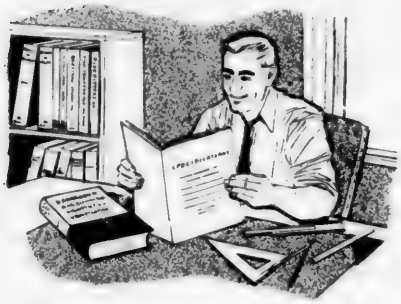

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ALPHABETICAL INDEX OF ADVERTISERS

A

Aerofin Corp. 5
Aerovent Fan Co., Inc. ..... *
Air Conditioning & Refrigeration Institute 54
Air Devices, Inc. 117
Air Filter Corp. ..... *
Air-Maze Corp. ..... *
Airtemp Div., Chrysler Corp. 119
Alco Valve Co. ..... *
Allen-Bradley Co. ..... *
Allen Cooler & Ventilator, Inc. 143
Allen, W. D., Mfg. Co. 20-21
Allied Chemical Corp., General Chemical Div. 17
Allin Manufacturing Co. 151
American Brass Co. 2
American Gas Association 42-43
American Machine and Metals, Inc. ... 41
American-Standard 46-47
Ammerman Co., Inc. 148
Anemostat Corp. of America 125
Armstrong Machine Works 1

B

Babbitt Steam Specialty Co. ..... *
Barber-Colman Co. 136-137
Bell & Gossett Co. 55, 133
Bethlehem Steel Co. 40
Binks Manufacturing Co. 159
Bridgeport Brass Co. 139
Bryan Steam Corp. ..... *
Buensod-Stacey, Inc. ..... *
Buffalo Forge Co. 37
Buffalo Pumps Div., Buffalo Forge Co. *
Burnham Corp. ..... *
Burt Manufacturing Co. ..... *
Byers, A. M., Co. ..... *

C

Cain Manufacturing Co. ..... *
Carrier Corp. 60
Chicago Pump Co. 147
Chicago Steel Furnace Co. 134
Clarage Fan Co. .....Inside Back Cover
Classified Advertisements 158
Cleaver-Brooks Co., Boiler Div. ..... *
Construction Specialties, Inc. ..... *
Cook, Loren, Co. ..... *
Cordley & Hayes ..... *
Coyne & Delany Co. ..... *

D

Davis Engineering Corp. ..... *
DeBothezat Fans Div., American Machine and Metals, Inc. 41
Dravo Corp. ..... *
Drayer-Hanson Div., National-U. S. Radiator Corp. ..... *
Dunham-Bush, Inc. 63
Dwyer, F. W., Manufacturing Co. ... 142

E

Edwards Engineering Corp. ..... *
Elgo Shutter & Mfg. Co. ..... *
Emerson Electric Mfg. Co. 28

F

Fafnir Bearing Co. 51
Farr Co. ..... *
Field Control Div., H. D. Conkey & Co. 135
Flexaust Co. 142
Foster, Benjamin, Co. 29
Frick Company 156

G

General Blower Co. 9
Governair Corp. 127
Geenheck Fan & Ventilator Corp. ... 143
Gustin-Bacon Manufacturing Co. 59

H

Halstead & Mitchell 123
Harris, Arthur & Co. 143
Hartzell Propeller Fan Co. 160
Heat-Timer Corp. ..... *
Henry Valve Co. ..... *
Hoffman Specialty Manufacturing Corp. 53
Hydrotherm, Inc. 138

I

Ilg Electric Ventilating Co. 11-13
Illinois Testing Laboratories, Inc. 150
Industrial Press 22, 32, 62, 157
Inland Steel Co. 155
International Boiler Works Co. 146
Iron Fireman Manufacturing Co. 33

J

Jenkins Bros. 7
Jenn-Air Products Co., Inc. 15
Johns-Manville 121
Johnson Service Co. .....Back Cover
Jordan Corp. ..... *
Joy Manufacturing Co. 115

K

Kaiser, E. B., Co. 36
Kramer Trenton Co. 52

L

Lawler Automatic Controls, Inc. ..... *
Lennox Industries, Inc. 148

M

Magnetrol, Inc. ..... *
Marley Co. ..... *
Marsh, Jas. P., Corp. 58
McDonnell & Miller, Inc. 25
McQuay, Inc. 18
Mercoid Corp. 144
Minneapolis-Honeywell Regulator Co. *

N

Nash Engineering Co. 64
National Tube Div., United States Steel Corp. 24
National-U. S. Radiator Corp. 131
New York Blower Co. ..... *
Niagara Blower Co. 146
Nibco, Inc. 23

O

OTM Corp. ..... *
Orr & Sembower Co., Inc. ..... *

P

Patterson-Kelley Co. ..... *
Peerless Electric Co. 30
Petro ..... *

HUGHES PRINTING CO.
EAST STROUDSBURG, PA.

ALPHABETICAL INDEX OF ADVERTISERS

Pittsburgh Plate Glass Co. 145
Powers Regulator Co. 56-57
Pyle-National Co. 48

Q

Quickdraft Corp. ..... *

R

Ray Burner Co. ..... *
Reading Tube Corp. 19
Research Products Corp. ..... *
Revere Copper & Brass, Inc. 26-27
Reznor Manufacturing Co. 151
Ric-Wil, Inc. 141

S

Sarcotherm Controls, Inc. 38-39
Skidmore Corp. 31
Smith, Jay, R., Mfg. Co. 153
Spence Engineering Co., Inc. ..... *
Sporlan Valve Co. 50
Spraying Systems Co. 149
St. Clair Rubber Co. ..... *
Sterling, Inc. ..... *
Stoddard Industries 140
Sturtevant Div., Westinghouse Electric Corp. ..... *
Symmons Engineering Co. 154

T

Taco Heaters, Inc. ..... *
Thermal Engineering Corp. ..... *
Trane Co. 35
Tuck-Aire Furnace Co. ..... *

U

United States Steel Corp., National Tube Div. 24

V

Vilter Manufacturing Co. ..... *

W

Wagner Electric Corp. ..... *
Waterloo Register Co., Inc. ..... *
Watts Regulator Co. ....Inside Front Cover
Webster Electric Co. 149
Weil-McLain Co. 44-45
Weil Pump Co. ..... *
Weirton Steel Co., Div. National Steel Corp. 49
Weksler Instruments Corp. ..... *
Western Engrg. & Mfg. Co. 152
Westinghouse Electric Corp., Sturtevant Div. ..... *
Wiremold Co. 144

Y

Yarnall-Waring Co. 61
York Corp. 129

Z

Ziegler & Co., G. S. ..... *

*Advertiser appeared in preceding issue

These 3 men
set up this tower in 2 hours

A Binks 3B4 cooling tower goes up in just 6 man-hours. Troublesome fabrication and fitting details are eliminated for you at the factory so you can figure job-site erection costs almost to the penny.

Once your tower foundation is in place, erection goes like clockwork. The blower, supporting frame, V-belt drive and motor and water basin are shipped sub-assembled. Tower casing, decking, drift eliminator, water distributing headers and gasketing materials arrive knocked down.

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Binks 3-B cooling towers are designed and built to give exceptionally quiet, trouble-free service year after year. Call-backs are few and maintenance is low.

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Whether you need a single tower with a 6-ton capacity or a multiple tower package up to 330 tons, you will find exactly what you need in the Binks 3-B series.

Send for free bulletins

See for yourself the many advantages which Binks cooling towers have to offer . . . in selection, in erection economy, in trouble-free service. Ask your Binks Branch Office for a copy of Bulletin 477-A and 333. Or, write direct. No obligation.

9152

Binks
EVERYTHING FOR WATER COOLING

A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

Binks Manufacturing Company
3120-38 Carroll Ave., Chicago 12, Ill.

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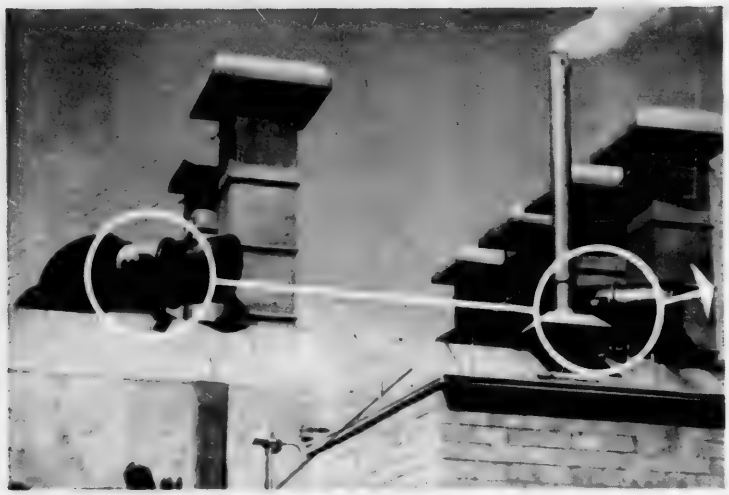
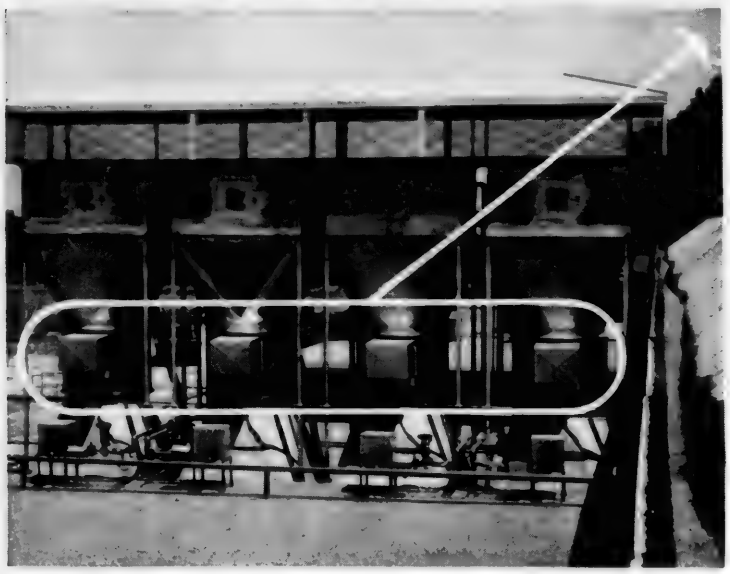
Hartzell belt-drive duct fans withstand heat and moisture

to keep production lines rolling at California Vegetable Concentrates, Inc.





The fan or blower which does an adequate job under routine operating conditions won't necessarily stand up when the going gets tough. Hartzell air moving equipment is designed and built with a plus capacity that allows it to take rough jobs in stride.

Typical of the unusual jobs which are a natural for Hartzell fans and blowers are these installations at California Vegetable Concentrates, Inc., Modesto, Cal. The top photo shows two of the five 44", 3 h.p. Hartzell belt-drive duct fans which exhaust 26,200 cfm of hot, wet air from a belt-type continuous vegetable dehydrator.

The lower photo shows four 48", 10 h.p. Hartzell belt-drive duct fans which supply heated air for a tunnel-type dryer. Each of these fans moves 30,800 cfm thru a gas fired heater (shown at the top of the stack). These fans are exposed not only to the high temperature of the entering air but to extreme radiant heat from the burners themselves.

Fan failure here would cripple the entire operation, but the customer reports that in 15 months of operation these fans have required only a minimum of routine maintenance. No damage due to heat or moisture has yet been detected.

For specific recommendations on how rugged, reliable Hartzell fans and blowers can help you solve your air moving problems, get in touch with your nearby Hartzell field engineer. If you don't know him, drop us a line for his name and address.

These installations were handled by the Hartzell field office at Santa Clara, California; P. O. Box 144, phone Cherry 3-3217.

here's a complete line of air moving equipment designed and built specifically for industry

Other famous Hartzell products include controllable and full feathering propellers for light aircraft, crop drying equipment and farm ventilating fans.
HARTZELL

HARTZELL PROPELLER FAN COMPANY • **55 Thomas Blvd. Piqua, Ohio**
Div. of Castle Hills Corp. A Member of AMCA Engineering Offices in Principal Cities

PROTECTION, CONTROL LINE ..... of Watts Regular Co. is complete. Includes tempering, vacuum relief, ASME T&P relief, water pressure reducing valves; automatic gas shut-off, low water cut-offs, boiler water feeders, dual control units, feed water pressure, temperature, and steam pressure regulators. Information available.
Inside Front Cover — Item 200

STEAM TRAP BOOK ..... published by Armstrong Machine Works discusses, among other questions, How Much Steam Should a Steam Trap Trap? The 44-page book, which is free, goes into great detail on the company's line of steam traps. Also covers selection, installation, and maintenance.
Page 1 — Item 201

PREASSEMBLED COPPER TUBE ..... makes for cost and time saving installation. Anaconda copper tube and solder-joint fittings for drainage lines, with plumbing trees than can be assembled in the shop or at the job, guarantee construction schedules are maintained. Complete information is available including bulletin on cast drainage fitting for back-to-back waste lines.
Page 2 — Item 202

HEATING AND COOLING COILS ..... from Aerofin Corp. offer greater transfer per square foot of space area and lower airway resistance, requiring less power per cfm. Bulletin is available.
Page 5 — Item 203

DISC EQUIPPED BRONZE VALVES..... from Jenkins Bros. offer top value in every component. For example, factor of safety in wall thickness of high tensile bronze body is many times higher than rating requires. Descriptive folder is available.
Page 7 — Item 204

CENTRIFUGAL FAN EQUIPMENT..... is available from General Blower Co. for a wide range of engineered air systems—low-, medium-, or high-pressure. Corrosion resistant models offered. Full product data and information available from company which features dependable, low cost ventilation.
Page 9 — Item 205

LIFETIME PROPELLER FANS..... manufactured by Ilg guarantee proper ventilation, cost little to operate, and need virtually no maintenance for years and years. Catalog and three bulletins offered, cover propeller fans, airfoil centrifugals, and power roof ventilators.
Pages 11-13 — Item 206

SILENT EXHAUSTERS..... by Jenn-Air have U-spring suspension which absorbs 44% more vibration than rubber isolators — a company exclusive. More than 75,000 units now in service without one case of suspension breakdown. Full line bulletin offered.
Page 15 — Item 207

SUPER-DRY REFRIGERANTS..... tradenamed Genetron are universally accepted for use as original or replacement charge in America's finest refrigeration and air conditioning equipment. Unexcelled quality and dryness. Includes refrigerants 11, 12, 22, 113, and 114a. Information available.
Page 17 — Item 208

HEATING AND VENTILATING UNIT.. called the McQuay Seasonvent is a large capacity unit engineered specifically for school auditoriums, theaters, and similar installations where smooth and quiet operation is a necessity. Capacities to 15,000 cfm. Information available.
Page 18 — Item 209

COPPER TUBING LINE..... available from Reading Tube includes: Lektroneal copper tube; Lektroseal copper refrigeration tube, soft tempered, easy forming, and dehydrated; Readi-Fin finned copper tube; and Mackenzie Walton precision copper tube. Also commercial copper tube, red brass and copper pipe, and threadless copper pipe. Information available.
Page 19 — Item 210

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement.

NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

NEW FIRE HOSE CABINET..... by W. D. Allen has foul-proof door rack. Rack swings a full 180 deg. and never fouls hose line. Cabinets available with or without extinguishers and with fire department valve when desired. Choice of sizes and styles for every requirement. Fire-check book offered, shows basic requirements for fire protection system.
Pages 20-21 — Item 211

WROT COPPER FITTINGS..... available from Nibco are not too thick or too thin. They heat quickly for fast assembly and they exceed strength requirements of recommended standards. The formula is the result of continuous research and decades of manufacturing experience. Catalog offered.
Page 23 — Item 212

STEEL PIPE..... produced by National Tube Div., United States Steel has the advantage of a distributor service which guarantees immediate delivery, a single, complete source of steel tubular materials, and valuable engineering and technical assistance. Information available.
Page 24 — Item 213

BOILER SAFETY DEVICES..... for every type and size of heating boiler and hot water plant found in schools, operating at any pressure up to 250 lb, are manufactured by McDonnell & Miller and covered in their complete catalog, which they offer.
Page 25 — Item 214

REVERE COPPER WATER TUBE..... is so much easier and faster to work with in air conditioning an existing building that it is bound to cost less to install than rustable pipe. So states J. E. McClellan, vice president, Mehring & Hanson Co., Chicago, air conditioning contractors for new Kemper Insurance Building, Chicago. Information available.
Pages 26-27 — Item 215

CUSTOM-ENGINEERED MOTORS..... are produced by Emerson-Electric to suit your specific needs. The company has more than 100 engineers for on-the-spot service for you. More than 65 years of experience in solving motor-drive problems. Information available.
Page 28 — Item 216

THERMAL INSULATION PROTECTED by Benjamin Foster Co., whose entire operating organization, including research, technical, production, sales, and management, are engaged in keeping your thermal insulation protected from fire, weather, chemical and physical abuse. Information available.
Page 29 — Item 217

FANS AND BLOWERS..... by Peerless Electric are offered. Testing to AMCA specifications and code is constantly under way in the company's quality control and research laboratories. Proper instrumentation measures hp input to the blower as it is transferred through the shaft to the blower wheel. Catalog offered.
Page 30 — Item 218

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
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45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	
200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265
266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	

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This card is void after July 1, 1959

CONDENSATE PUMPS.....
from Skidmore Corp. have mechanical shaft-seal and close-coupled design. They offer more capacity, more performance. Bulletins are available.
Page 31 Item 219

BURNER FOR MEDIUM BOILERS.....
produced by Iron Fireman has all the advantages of big burners but needs no more supervision than domestic units. Information and specifications on the WhirlBlast burner offered.
Page 33 Item 220

NEW SIDEWALL VENTILATOR.....
makes the Trane ventilator line more complete than ever. Handles large volumes of air against static pressures. Exclusive bottom-louvered discharge away from building provides positive protection against driving rain and snow. Wheel sizes from 7 to 15 inches. Information available.
Page 35 Item 221

UNDERGROUND SYSTEMS.....
for heat distribution are a specialty of E. B. Kaiser Co. Hints on specifying Ebko piping systems are detailed in advertisement. A 24-page catalog with facts and figures for designing and specifying underground heat distribution systems is offered.
Page 36 Item 222

FAN BULLETINS.....
offered by Buffalo Forge describe Classes I, II, III and IV fans for moderate and high pressure requirements. These fans will perform as promised in the catalogs. Company's 81-year reputation is your guarantee.
Page 37 Item 223

BIFURCATORS.....
available from DeBothezat are located anywhere in the boiler room. Motor speed controllers on these induced draft fans ensure that draft will keep pace with boiler needs—from full speed to 50% reduction. Used for high pressure boilers delivering up to 60,000 lb steam; low pressure boilers to 100,000 EDR. Catalog offered.
Page 41 Item 224

COOLING WITH GAS.....
can put a heating plant on a year-round economical basis. Gas operated Arkla-Servel absorption-type water chiller boasts lowest operating costs, fully automatic operation, long service, packaged construction, and easy installation. Information available.
Pages 42-43 Item 225

NEW BOILER-BURNER UNITS.....
offered by Weil-McLain are the first cast iron boiler-burner units for No. 5 or combination gas and light oil. Available in a capacity range from 3,395 to 12,260 sq ft of steam. Burner service is provided for one year, including start-up. Complete information contained in bulletin.
Pages 44-45 Item 226

NEW INDUSTRIAL DIVISION.....
of American-Standard was created to serve you better. Now you benefit from the combined engineering background and product lines of American Blower, Ross Heat Exchanger, and Kewanee Boiler. One source for air conditioning, heating, ventilating, heat transfer, dust collection, and fluid drives. Bulletin available.
Pages 46-47 Item 227

AIR-LIGHT TROFFER.....
offered by Multi-Vent Division provides both air and light from the same unit. The air diffuser is completely concealed in the flush light fixture. Provides draft-free air conditioning with highly efficient lighting at substantial cost savings. Detailed literature available.
Page 48 Item 228

BOOKLET ON ZINC-COATED STEEL..
published by Weirton Steel contains 12 pages that explain in detail how Weirkote can help you. It goes through the most tortuous jobs in the shop and never chips or flakes.
Page 49 Item 229

REFRIGERATION SPECIALTY LINE...
finds its place in every air conditioning installation. Sporian Catch-All filter-driers, new See-All moisture and liquid indicators, Flow-Master element (exclusive with the company's thermostatic expansion valves), and refrigerant distributors included. Information available.
Page 50 Item 230

SUPER-QUIET BALL BEARINGS.....
from The Fafnir Bearing Co. applied to the blower shaft mountings of the Lennox Landmark year-round conditioner provide whisper quiet service which is as much a comfort feature as the "made to measure" heating and cooling. Bulletin is available.
Page 51 Item 231

AIR COOLED CONDENSER.....
manufactued by Kramer-Trenton has 50% more capacity than any other. Unicon units have all aluminum casings which ends rust and corrosion. Time-tested Winterstats prevent low receiver pressure, insure start-up under any weather conditions. Bulletin available.
Page 52 Item 232

NEW F&T TRAP.....
added to Hoffman line. Series 50 unit has an integral thermostatic air by-pass consisting of thermal element, seat, and cage—factory set and sealed—assuring dependable service and easy maintenance. The company's engineers anticipate industrial steam heating of less maintenance and operating costs. Information available.
Page 53 Item 233

ARI SEAL BOOKLET.....
explains Seal or Certification program of Air-conditioning and Refrigeration Institute for unitary air conditioning equipment, your guarantee that the unit's rated capacity is in accordance with ARI Standards. A directory of manufacturers participating in the program is included.
Page 54 Item 234

PACKAGE LIQUID COOLER.....
offered by Bell & Gossett is a completely integrated and assembled unit, well designed and compact, with all major components covered by this one manufacturer's guarantee. In capacities from 7½ through 150 tons. Information available.
Page 55 Item 235

DESIGNING A NEW HOSPITAL?.....
The Powers Regulator Co. makes more of the essential thermal comfort controls for modern hospitals than any other single firm. A few of these items are illustrated in ad. Control for each individual room and various types of baths. Information available.
Pages 56-57 Item 236

DIAL THERMOMETERS.....
offered in new and complete line by Jas. P. Marsh with the company's precision and accuracy, designed down to the last detail for piping and duct work. For use on heating and cooling equipment, air ducts, vessels, kilns, ovens, etc. Bulletin offered tells the whole story.
Page 58 Item 237

DUCT INSULATION.....
called Ultralite, is made by Gustin-Bacon exclusively of long, strong, textile-type glass fibers. It is outstanding in thermal efficiency and ease of application. Information is offered.
Page 59 Item 238

NEW FAN-COIL ROOM UNITS.....
announced by Carrier for commercial, industrial and residential buildings. These new 36T Weathermakers are designed to work with a boiler-chiller source of heating and cooling. They operate independently to provide exact conditions for each room. New 16-page catalog offered.
Page 60 Item 239

PACKED EXPANSION JOINTS.....
produced by Yarnall-Waring guarantee continuous service. Gun-Pakt joints never need repacking, are rugged, dependable, all-steel units. Many in service over 25 years with only nominal maintenance and with no major repairs. Never a shutdown for repacking. Information available.
Page 61 Item 240

COOLING-HEATING CONDITIONER ...
is Dunham-Bush's new key to smaller requirements. This compact fan-coil unit for mounting between the studs of a wall structure is designed to meet the smaller space and capacity requirements of motels, hotels, apartments, and residences. Complete specs offered.
Page 63 Item 241

VARIABLE-PITCH BLADES.....
permit change of volume and pressure characteristics of the vane-axial fans offered by Joy Manufacturing Co. There are 160 standard models. Information is offered.
Page 115 Item 242

SLOT-TYPE DIFUSERS.....
sold by Air Devices, Inc. guarantee greatest possible uniformity of air flow while enhancing modern architectural design. One mile of Stripline diffusers installed in Int'l Minerals & Chemical Corp. Administrative and Research Center, Skokie, Ill. Stripline catalog offered.
Page 117 Item 243

AIR CONDITIONING LINE.....
by Chrysler Airtemp provides the largest choice of units in the industry. Every unit includes, as standard equipment, important features that would cost up to $364 to add to conventional air conditioning. Almost 300 combinations from 3 to 45 tons. Information available.
Page 119 Item 244

TRANSITE VENT PIPE.....
produced by Johns-Manville is made of asbestos-cement; retains its original, attractive appearance, and saves on upkeep because it resists the attack of most gases, mists, fumes, and dusts. It is unaffected by weather. Full information is available.
Page 121 Item 245

QUIET AIR-COOLED CONDENSERS...
offered by Halstead & Mitchell have had fan noise, vibration, and rattling engineered out of them. Deep pitch fans are run at slow speeds. Casings are rugged and will not loosen with use. Provision for winter operation and multiple circuiting. Information available.
Page 123 Item 246

AIR DIFFUSION EQUIPMENT.....
is produced by Anemostat in an impressive variety to meet every architectural and engineering requirement. Trademark guarantees quality. Information on complete line available.
Page 125 Item 247

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"SATISFABRICATED" CONDITIONERS are what Governair calls its 422 completely packaged air conditioners which are built to suit your requirements. Now you design your own air conditioning. Information available.
Page 127 Item 248

AIR CONDITIONER LINE..... manufactured by York is worth more to customers who buy it and to dealers who sell it: Faster cooling with more efficient vertical air discharge; 30% more humidity removal; longer peak performance; 15% savings on operating costs; and ultra quiet. Information available.
Page 129 Item 249

YEAR-ROUND AIR CONDITIONING.... for new motor lodge has three-way temperature controls for each unit. Installation includes National-U.S. boilers for faucet hot water, National-U.S. oil-fired boiler for hydronic heating, National-U.S. water chiller, baseboards, fan-coil units. Information on line offered.
Page 131 Item 250

QUIET OPERATING PUMPS..... are one of the most important features in a circulated water heating or cooling system. Pumps made by Bell & Gosset meet this challenge. Information is available.
Page 133 Item 251

STAINLESS STEEL FURNACES..... available to 2.5 million Btu's from Chicago Steel Furnace Co. Maxi-Therm units use costlier No. 442 stainless steel in combustion chamber construction, in heavier gage. High Btu output for industrial and commercial applications. Up flow, counter flow, horizontal, and duct units. Oil and/or gas fired, single or dual fuel. Specification details offered.
Page 134 Item 252

TRIPLE-FUEL DRAFT CONTROL..... has joined the Field family. The M+MG2 is available in 10 through 32 inch sizes for oil, oil-gas, gas, and solid fuel furnaces and boilers, employing either natural, induced, or forced draft. Unit is a very heavy duty, highly sensitive control, maintaining draft settings as low as 0.002 inches. Application engineering data available.
Page 135 Item 253

HIGH VELOCITY AIR CONTROL..... is discussed in Barber-Colman advertisement. Gives facts about selection of control units for efficient design, constant cfm delivery, and simplified stabilization of a system. New bulletin gives valuable high velocity system design data.
Page 136 Item 254

NEW MOTOR OPERATOR..... from Barber-Colman Co. is transistorized for proportional control. Electronically controlled device offers superior performance and low maintenance. Brochure is available.
Page 137 Item 255

BIG GAS HEAT UNITS..... offered by Hydrotherm, Inc., enables the "big jobs", requiring up to 3.6 million Btu to enjoy the convenience and cleanliness of gas heat. MultiTemp system achieves true input modulation, limits gas consumption, insures against service interruptions. Ideal for volume hot water, too. Catalog available.
Page 138 Item 256

CONDENSER TUBE..... manufactured by Bridgeport Brass, specialists in metals from aluminum to zirconium, has proven its dependability in 1000 heat pumps made by Typhoon Heat Pump Co. Admiralty tubes guarantee that there will be no heat pump failure due to corrosion. Information available.
Page 139 Item 257

ELECTROSTATIC FILTERS..... called Dust-magnets are a product of Stoddard Industries. They trap particles as small as 1/10 of a micron. Permanent and non-clogging, they are simply rinsed clean and replaced when dirt-laden. Available for furnaces and air conditioners. Information available.
Page 140 Item 258

UNDERGROUND PIPING SYSTEMS... by Ric-wiL are safe and secure from tornados and hurricanes—virtually unaffected by surface weather conditions. More than 8 million lineal feet of proven installation. Completely prefabricated; ready to install. Revised catalog available.
Page 141 Item 259

AIR FILTER GAGE..... from F. W. Dwyer Mfg. Co. tells you exactly when to replace filters, assuring maximum filter efficiency. Gives a continuous, accurate check that spots inefficient filters, yet prevents waste through premature replacement. Bulletin describes the gage.
Page 142 Item 260

FLEXIBLE HOSE..... from The Flexaust Co. is adaptable for all kinds of fume and dust control and ventilation uses. It is durable, lightweight, and easy to install. Information is available.
Page 142 Item 261

ROOF VENTILATION LINE..... from Allen Cooler & Ventilator, Inc., meets all requirements efficiently and economically. Low contour units, high velocity units, wind-driven turbines, and exhaust fans. Catalog is available.
Page 143 Item 262

INDUSTRIAL FLOAT CATALOG..... offered by Arthur Harris & Co. describes copper, stainless steel, Monel, steel, brass, and aluminum industrial floats built for open or closed tank operation at low or high pressures and temperatures.
Page 143 Item 263

AIR MOVEMENT DEVICES..... by Greenheck features the 1959 Columbus centrifugal power roof exhauster with clean, solid lines and direct drive. Range is from 75 to 22,000 cfm. Features non-overloading wheels, rubber vibration mountings, rugged ball bearing motors isolated from exhaust air stream. This unit and a companion belt-drive series described in engineering bulletin available.
Page 143 Item 264

FLEXIBLE AIR DUCT..... from The Wiremold Co. is made with a flat metal spiral that mechanically locks to the fabric component. Two lengths join simply by screwing. Information is available.
Page 144 Item 265

TEMPERATURE CONTROLS..... made by Mercoid Corp. include a new Series DAH-35 remote stem, explosion-proof control weighing about 9¼ lb. Details on outside adjustment, visible calibrated dial, sealed mercury contact, panel or surface mounting, and operating ranges described in bulletin offered.
Page 14 Item 266

FIBER GLASS INSULATION..... is an excellent acoustical and thermal lining for sheet metal ducts, and is made by Pittsburgh Plate Glass. Withstands air velocities, has proven erosion resistance, and is easy to work on the job. Especially adaptable for use in irregularly curved ducts.
Page 145 Item 267

TROUBLE-FREE CONDENSING..... and great power and labor savings are provided by the design of condensers from Niagara Blower Co. Bulletin is available.
Page 146 Item 268

WATER TUBE PACKAGE BOILER..... offered by International Boiler Works is the first forced draft water tube package boiler whose cost is comparable to most fire tube units—yet offers much more in efficiency and economy. Compak units guaranteed 81% efficient. Full details available.
Page 146 Item 269

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SUBSCRIPTION DEPARTMENT

CLOG-PROOF SEWAGE PUMPS..... made by Chicago Pump Co. are standard equipment in fine buildings. Only liquid is handled by impeller. Solids retained in strainer housing until cleanly flushed to sewer. Company offers complete details.
Page 147 Item 270

INDUSTRIAL HEATER..... has remarkable adaptability. Lennox Series OG units have efficient heat transfer design resulting in reduced physical heater size. Dual fuel power burners. Spec sheets offered.
Page 148 Item 271

CENTRIFUGAL ROOF EXHAUSTERS.. of lowest silhouette design by Ammerman enhance the beauty of building skylines. Forward or backward curved wheels within or without scroll housing. Certified cfm ratings. Bulletin is available.
Page 148 Item 272

SUPPLY PUMPS..... from Webster Electric are available in capacities to 575 gph. Handle all furnace oils, especially heavy Nos. 5 and 6 grades —with an extra measure of dependability required for commercial and industrial applications. Compact and easy to install. Engineering bulletins with complete specifications and mounting dimensions offered.
Page 149 Item 273

SPRAY NOZZLES..... from Spraying Systems Co. lower the cost of conditioning air because the company designs them for exact control of spray characteristics and offers them in a complete range of sizes for selecting the exact capacity needed. For washing, humidifying, and cooling. Two bulletins give all the details.
Page 149 Item 274

DIRECT READING VELOMETER..... measures actual air delivery. Simple, direct reading gives instant measurement in any distribution system. Alnor velometer is portable, easy to understand and to use. Bulletin is available.
Page 150 Item 275

GAS UNIT HEATERS..... from Reznor Manufacturing Co. react instantly, automatically, to requirements of their immediate surroundings, delivering where it is needed. Ideal for a variety of commercial and industrial buildings. Booklet is available.
Page 151 Item 276

POSITIVE SEALING INDICATORS..... made by Allin Mfg. Co. proven on thousands of production line installations have one piece extension gasket for positive sealing and fool-proof assembly. Six sizes. Complete line catalog available.
Page 151 Item 277

ROTARY ROOF VENTILATORS..... from Western Engineering and Mfg. Co. have lifetime guaranteed bearings. High, constant exhaust capacity is assured. Catalog is available.
Page 152 Item 278

HYDROSTATIC SHOCK CONTROL..... produced by J. R. Smith, controls water pressure with pneumatic pressure. Provides a more effective and efficient way to control hydrostatic shock and eliminate water hammer in any hot or cold water piping system. Six sizes. Booklet available.
Page 153 Item 279

SHOWER MIXING VALVE..... provides positive protection. Symmons Safetymix automatically eliminates the constant danger of scalds or chills. Costs no more than ordinary shower valves. Bulletin available.
Page 154 Item 280

GALVANIZED SHEET..... produced by Inland Steel Co. will not peel or flake. Ti-Co sheet is tough, firm, yet soft enough to take the most complicated forming: Pittsburgh lock-seaming or any other tough fabricating process. Information available.
Page 155 Item 281

REFRIGERATION EQUIPMENT..... from Frick Co. is world renowned for a long, trouble-free life of dependable operation in any refrigeration service. Information is available.
Page 156 Item 282

COOLING TOWERS..... available from Binks Mfg. Co. can be set up in 2 hours by 3 men. Troublesome fabrication and fitting details eliminated. Exceptionally quiet and trouble-free. Bulletin available.
Page 159 Item 283

BELT-DRIVE DUCT FANS..... from Hartzell Propeller Fan Co. withstand heat and moisture. Typical of the unusual jobs these fans are called upon to perform is the exhausting of 26,200 cfm of hot, wet air from belt-type continuous vegetable dehydrator at California food processing plant. Information available.
Page 160 Item 284

QUALITY AIR HANDLING..... is achieved with Clarage fans. Typical installation is new Charlotte, N. C., building where 10 Type NH system fans and 8 Ready Unit ventilating sets were specified. They perform quietly, economically, dependably. Information available.
Inside Back Cover Item 285

SUBMASTER THERMOSTATS ..... for control of air, steam and liquids are offered by Johnson Control. Choice of three, fully interchangeable, elements. Variable ranges of remote adjustment. Adjustable sensitivity. Unaffected by ambient temperature. Direct or reverse acting. Complete data on this Series T-901 available.
Back Cover Item 286

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Circle below item numbers on which you wish catalogs or further information

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45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	
200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265
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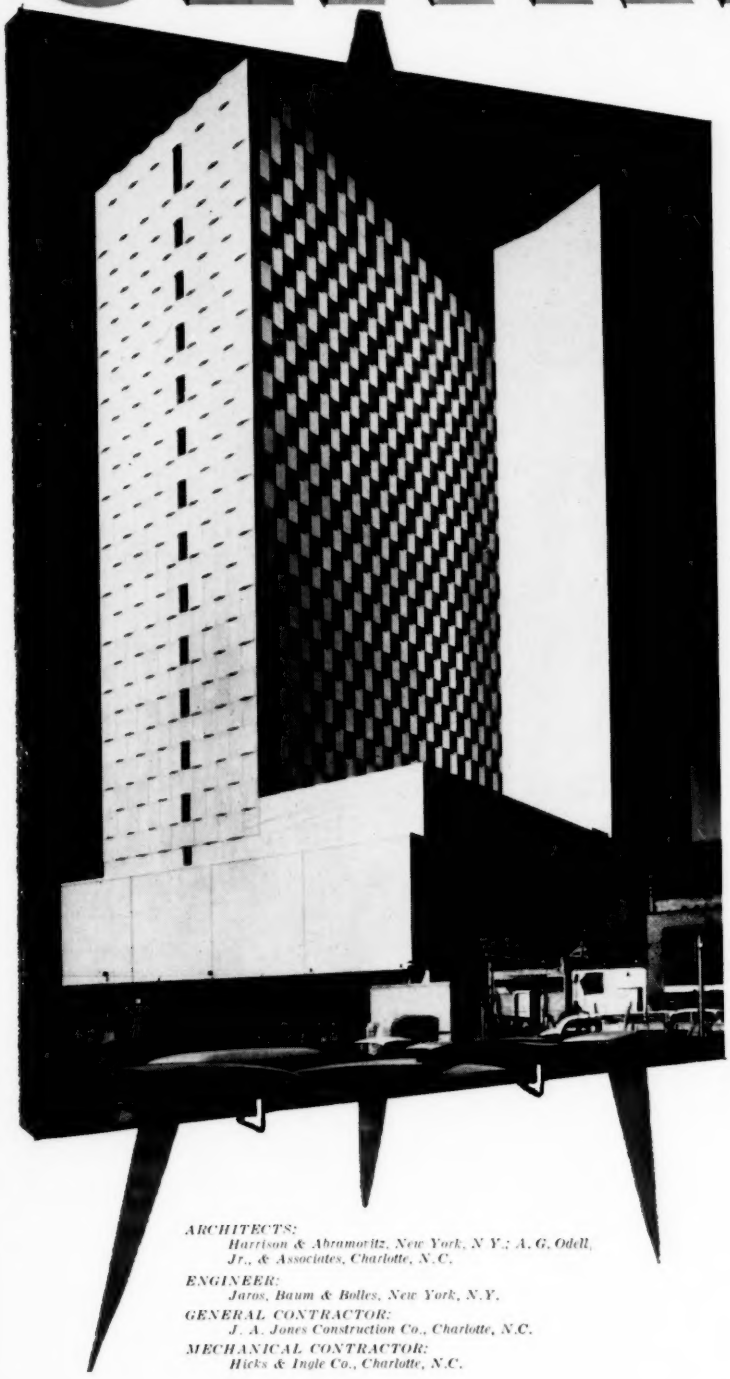

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T-901 Submaster Thermostat

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- All elements are fully interchangeable.
- Variable ranges of remote adjustment. Special stops may be set to limit readjustment action, in either or both directions, to any segment of the full range of adjustment available.
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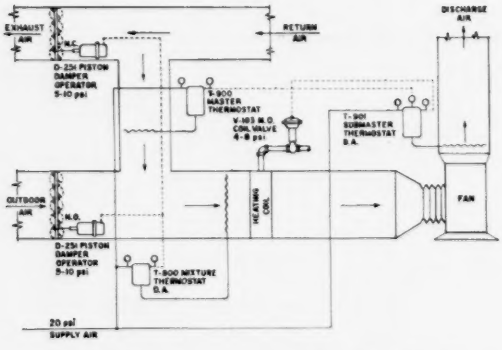
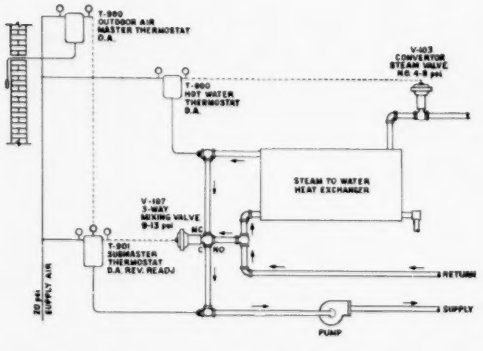
For complete data, write for Bulletin T-901. Johnson Service Company, Milwaukee 1, Wisconsin.



T-901 Submaster Thermostat controlling fan discharge temperature—reset from master thermostat in return air.



T-901 Submaster Thermostat controlling hot water supply temperature—reset from outdoor master thermostat.

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